Facts For Childless Couples

Second Edition

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To my wife, my two daughters and my four grandchildren

Preface to Second Edition

NOW that some eighteen years and five printings have elapsed, my good friend, Payne E. L. Thomas of Charles C Thomas Publisher, has requested a new edition of this little book

Some ten years ago a Revised Fourth Printing embraced an additional chapter, Chapter X.

It is my concept that a new edition for a little book, as this one, does not necessitate so much the addition of new pages but rather the taking of an inventory of the fidelity of what was written previously, the rectification of out-moded concepts, and the addition of new facts and tangential fads.

Accordingly, it is hoped that this new edition represents truthfully the *status quo* of things I currently believe.

What was written in the first edition still meets with my general approval. It is hoped that this is not uncritical smugness Little has been changed: essentially some chronological data regarding the peregrinations and "nesting" of the fertilized egg and some scaling down of spermatozoal counts which may be accepted as average norms

Chapter XI, "Some New Facts and Fads," is added in the hope of reflecting the new thinking and practices of the past decade.

In the past, many copies of this little book passed through many hands. Now I find that some mothers are supplying their copies to their childless daughters. It is hoped that these pages will continue to fulfill the original purpose of indoctrinating childless couples and leading them to seek competent and sympathetic medical care. The author hopes that, despite his age and the maturity of these pages, the reader will still find up to date and critical information.

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Preface to Revised Fourth Printing

THE kind reception of the first three printings of this little book fully justifies the original suggestion of my good friend and publisher, Charles C Thomas, that it should be written. It has made new friends for the author in the medical profession and among childless couples. Their expressions of its helpfulness prompt this Revised Fourth Printing.

Few changes have been made. It seemed advisable, however, to add Chapter Ten in which some practical suggestions are made to childless couples, including indoctrination into the use of basal temperature records for evaluating the quality of ovarian function and for timing coition with ovulation.

The author acknowledges with sincere appreciation the helpful comments and suggestions from many readers of the first edition.

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FACTS FOR
CHILDLESS COUPLES

Chapter One

General Considerations of Childlessness

"WHY can't we have children?" Each year more couples go to their physicians for answers to this question. Even larger numbers of childless couples would seek medical aid if they knew that expert examinations often lead to the institution of successful treatments. Too many couples resign themselves to their childless state because of the belief that nothing can be done.

Childlessness of couples is due to three general causes:

Pregnancy wastage,
Effective contraceptive measures, and
Involuntary sterility.

The term "pregnancy wastage" is employed to cover those instances in which pregnancies occur but, as the result of disease, accidental complications or intentional interference, do not progress to the birth of living children. One of the major aims of the care-

ful, detailed prenatal care which the obstetrician gives *his* patients *is* the prevention of abortions, miscarriages, premature labors and stillbirths and their damaging effects upon the health and fertility of prospective mothers.

Despite all the efforts of medical and social agencies, however, the number of abortions, criminal and innocent, remains large. Effective contraceptive regimen, on the one hand, and less puritanical gossiping about and more practical sheltering of the single pregnant girl or woman, on the other hand, are logical answers to criminal abortion. The abortionist usually is able to ply his trade despite professional ostracism or legal statutes. Serious illnesses or dangerous impairments of health may enforce childlessness upon some women; under these circumstances no other choice exists for them but the practice of rigid contraception and, if pregnancies accidentally occur, reputable physicians feel called upon to terminate them by relatively safe surgical methods. Innocently recurring abortions, often at about the same stage of each pregnancy, may rob women of desired motherhood, medical aid at present can do much for these women in their struggle to carry these pregnancies to term.

Voluntary sterility, except in the case of its imposition because of chronic disease or serious impairments of health, results generally from real, rela-

tive or presumed economic insufficiency. Few healthy well-balanced couples do not want children. Voluntary sterility combined with late marriages and competitive economic and social endeavors may result eventually in involuntary sterility due to postponement of attempts at pregnancy until the period of optimal fertility and reproductivity is past. There is little likelihood that contraceptive measures of the kind generally employed at present have any tendency to impair the potential fertility of couples. This statement does not apply to the cruder methods of the past, these often produced permanent damage to the reproductive organs of women. With the present-day frank attitude of the public, the lay press and the medical profession toward contraception, there is little excuse for a couple not having authentic information in this regard.

The prevalence of involuntary sterility is great. It is estimated generally that one in every eight or nine couples is sterile against its will. This estimate probably remains essentially correct even at present despite the increased birth rate beginning in 1941. Elements in this increase include discontinuation of contraceptive schedules by many couples and early marriages of others, the impelling forces in each instance being improvements in economic affairs and maternal urges of war. This acute upswing probably will have little permanent effect upon the two-cen-

tury-old downward trend in birth rates in this country.

A couple should not become alarmed over presumed sterility until two years of infertile mating have elapsed. (The woman, however, who has waited until her late thirties to marry or to attempt conception is usually impatient at such a generalization.) A couple, both of whom are apparently quite healthy, may mate for several years without conception. The explanation is that no couple is 100 per cent fertile; this absolute fertility probably exists only among wild animals. The majority of couples have relatively high fertility whereas others have low fertility or relative sterility. Relatively few couples are absolutely sterile. In the majority a number of minor factors operates to lessen fertility. The recognition of these factors by careful diagnostic studies may permit improvements to be made in fertility.

Couples, which are desirous of children, should seek competent medical counsel when they have experienced two years of sterile mating. They should feel no hesitancy, shyness or shame in sharing their problems with their physicians. In practically every instance the responsibility of the initiative in asking *for professional aid will fall upon the wife.* Not infrequently the husband feigns indifference to cloak his masculine ego which is secure in the belief that nothing is wrong with him and his emotions may be

aroused and his pride wounded if the suggestion is advanced that he should be examined. The immediate result of such a suggestion is a barrage of excuses; he is too busy; he will have an examination at his earliest convenience; the examination is useless since his sexual prowess has been well established in premarital escapades which he relates confidentially, etc.

There is little justification for this not uncommon, uncoöperative attitude on the part of the husband except that the male has long confounded sexual drive and fertility. This ungracious attitude of many husbands, which at times may lead to the condescending compromise that, if the wife's examinations fail to show "it is her fault," he will undergo examination, and the outgoing willingness of most wives to coöperate with their physicians to the utmost have resulted too frequently in half-way diagnostic studies and, because of these, much expensive and time-consuming therapeutic mauling of the wives. Physicians and wives should insist from the outset that the husbands coöperate; if not, diagnostic studies should not be initiated.

Let a husband understand these things. His moiety in procreation is more than that of exercising his "marital rights." The reproductive obligations of the race are not solely responsibilities of women. Nearly one-third of the causes of infertility lies on the husband's side of the ledger. The assessments of a

husband's fertility may be done expeditiously and without any discomforts to him. The wife's investigations are more tedious and time consuming and entail some minor discomforts. The husband, as a member of the couple's connubial coöperative, should shoulder graciously his reproductive responsibilities and regard these in their true perspective. Not much can be expected from a physician's endeavors if a husband be uncoöperative, militant and dilatory as regards his examinations.

A couple usually goes to its family physician or to a gynecologist or obstetrician for medical direction regarding presumed sterility. The family physician is as always a good and sympathetic counsellor. Busy with the care of the sick, he spends much of his spare time in keeping abreast of the continuous advances in the art of healing. He may point out frankly that the investigation of sterility requires special facilities and training which he does not possess and, accordingly, he will suggest that he be permitted to arrange appointments with clinics wherein these examinations properly may be done. The conscientious practitioner does not waste the financial resources or valuable time of his patients by using empiric, hit-or-miss treatments which are founded upon no secure diagnostic data. Similar counsel may be given if gynecologists or obstetricians are consulted. The fact that a physician has had special training in gynecology or

obstetrics does not imply necessarily that he possesses all of the required facilities of training for the investigation and treatment of sterility.

There are some aspects of the practice of medicine which should be called to the attention of the childless couple. The primary responsibility of a physician is the assurance of competent medical care to the sick. Medical practice, although for the most part founded upon private enterprise, has always assumed voluntarily, when necessary, the medical care of the indigent and unfortunate. A good portion of many physicians' practice entails no financial returns but, at the same time, may require cash expenditures. Sterility cannot be defined as a sickness for which care and treatment cannot be denied It is quite presumptuous, therefore, to expect a busy practitioner to expend his time, energy, acumen and money investigating and treating the sterility of a couple, unless the couple recognizes and accepts its financial responsibility.

What about the cost of proper medical services for a childless couple of the low income group? Medical fees vary from community to community and any estimates as to costs would be presumptuous, in poor taste and without the province of this discussion It should be stated that this type of medical service is not beyond the reach of such couples. Many clinics have found it to be practical and very satisfactory to

the patients to make quotations in advance for a flat rate fee to cover all the routine and special diagnostic studies of a couple. If subsequently the diagnostic data indicate the need for prolonged therapies, flat rate charges frequently are made for these. This business-like approach allows the couple to anticipate and budget its investment in procreation.

What provisions exist for indigent couples which are supported and given medical service by welfare agencies, if they are childless and want children? In a few large cities charity sterility clinics are operated. The primary purpose of these is for the implementation of research rather than for the rendering of free medical service to the childless. Despite the just and worthy expansion of public health service and social medicine, *investigation and care of the charity childless* couple cannot be envisioned as being a responsibility of the already over-burdened free dispensaries or public health clinics. Frankly, the practicing physician's thoughts on the matter are generally these. if a sterile couple is unable to meet at least the cost of its proposed examination and treatments, it seems doubtful wisdom to encourage it to assume possibly the financial burden of ultimate pregnancy, confinement and subsequent care of an offspring. Under these circumstances, sensible medical advice is the suggestion that the couple *wait until its fortune* changes before undertaking a fertility program.

There are some eugenic and social aspects of sterility which intelligent patients and their physicians recognize. Many states have set up Boards of Eugenics to pass upon proposals for sterilizations of some of their citizens who have been adjudged socially and medically unfit for reproduction. It would be a strange and inconsistent world if some of the couples, who seek medical aid because of their inability to procreate, were not unfit for parenthood because of disease, hereditary taints, moral degeneration or innate temperament. Recognizing these circumstances, a physician may utter a silent amen to the wisdom of a provident Nature and with sympathetic understanding explain to these couples the undesirability of their procreation It would be a hollow and narrow medical approach which ignored these cogent eugenic factors. Indeed the intelligent couple should pose two questions to its physician: "Are we fit to have children? If so, why can't we?"

Many dysgenic unions, with their attendant conflicts and incompatibilities, might be prevented by a wider acceptance of sociologic and medical programs designed to prepare couples for marriage. Sympathetic conferences with and careful medical examinations of both members of the engaged couple may uncover many problems and dispel many misconceptions. These examinations could be broadened profitably to include some assessment of fertility. Frank

counsel from these data at times might permit changes in marital plans before it is too late to avoid unhappy disillusionment and, perhaps, a trip to a divorce mill.

Too often a well-intentioned couple delays its premarital conferences and examinations until the ink is well dry on the wedding invitations and the church is decorated; then little can be accomplished save the giving of information on sexual hygiene and contraception. In these cases the real worth of the sociologic and medical premarital program is lost. A broad application of this type of program pays big dividends from a gynecologic, obstetric and hygienic point of view. It curtails materially visits from desperate and emotionally upset wives who "must have a baby to save the marriage." One wonders really how many marriages can be salvaged at this stage even by motherhood.

Anything more than the most superficial consideration of sterility brings us face to face with gravely significant sociologic problems. The most serious of these is the fact that most children are born in families socially and financially least capable of supporting and rearing them. Prodigality of offspring is too frequently associated with paucity of opportunity. The present social, economic and international crisis brings into sharp focus this glaring defect in our breeding pattern Many potentially desirable parents comprise the group of voluntarily sterile couples;

these should assume their reproductive responsibilities, if we are to escape social deterioration. The terrific toll which the past war took of the world's fittest young men emphasizes this need. This same eugenic and social point of view urges that every effort be made to salvage good breeding stock from those couples involuntarily sterile.

Chapter Two

Reproductive Functions of the Husband

THERE is nothing shameful about the reproductive function of man and woman. The only indelicacies which plague discussions of the sexual organs, their functions and their diseases, stem from the scientific inarticulateness of most patients and from their ignorance of their own anatomy and physiology. There is nothing more pathetic to a physician than a refined, educated man or woman groping for words, other than common vulgar ones, to describe his or her sexual impulses or portions of his or her generative systems. Assuredly, this is the fault of our medical profession, which should have been more active in sponsoring more worth-while high school and college courses in hygiene and physiology.

Education has missed one of its serious tasks when it fails to teach the barest fundamentals of sex anatomy and physiology. With the last few years' stripping of the false caul of shame from discussions of

sex physiology and pathology, definite advances are being made in the education of the populace in reproductive hygiene. There is much yet to be accomplished.

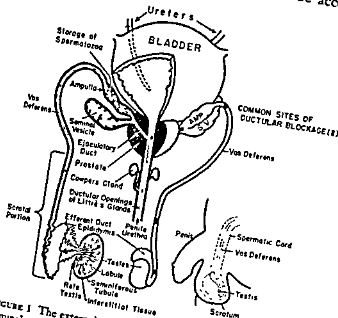


FIGURE 1 The external and internal sexual organs of the male The seminal pathway from testis to penile urethra is illustrated and common sites of obstructions in the pathway are designated.

At this stage, risking the accusations of academic pedagogy and of undue technicality, an attempt will be made to outline simply the anatomy and function of the genital and endocrine systems of the husband

and the wife. Medical terminology is used whenever it is necessary with a view of supplying a scientific vocabulary to those who do not skip these sections in their reading.

The dominant organs in the male genital and endocrine systems are two TESTES. These are contained in a pouch made of skin, fibrous tissue and muscle. This pouch is called the SCROTUM. In addition to the protection it affords the testes, the scrotum functions as an extremely efficient heat-regulating or air-conditioning unit which keeps the testes several degrees cooler than the internal temperature of the body. This is necessary for their normal function, since the male germ cells, SPERMATOZOA, which the testes manufacture, are very susceptible to body temperatures.

The testes have two important duties, the manufacture of male germ cells, the spermatozoa, and the secretion of a substance which contributes the manly functions to an individual. Accordingly, the testes contain two different portions: the SEMINIFEROUS TUBULES and the INTERSTITIAL TISSUE.

The seminiferous tubules are hollow tubes which are intricately coiled upon themselves in a vine-like fashion. They lie within each of some 200 to 500 compartments or LOBULES of the testes. Filling in the spaces between these coiled tubules is the connective and interstitial tissue. The seminiferous tubules are lined by many layers of cells, the seminal epithelium.

These layers of the seminal epithelium represent various stages in the continuous process of forming and developing spermatozoa, known as SPERMATOGENESIS. It has been said that if all of the seminiferous tubules were laid end to end they would stretch a thousand feet. This great linear expanse of the seminal epithelium is a safety provision of Nature which permits spermatozoa to be developed over wide areas thus protecting this important function to some extent against possible local injuries or diseases

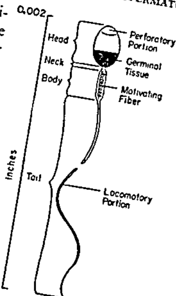


FIGURE 2 The different portions of the spermatozoon or the male germ cell.

Spermatozoa are the male germ cells which fertilize the female eggs or ova. They carry with them the hereditary moiety of the father. When the spermatozoa have reached an ample stage of development in the seminal epithelium, they are discharged into the cavity of the seminiferous tubules where they are bathed in a thin, watery discharge.

They look much like microscopic-size tadpoles. A spermatozoon has a head, neck, body and tail. Its head carries the important germinal tissue for fertilization whereas its tail serves as an organ of locomotion, which it moves in a whip-like fashion. In the testes and the genital tract spermatozoa are not motile. They only become active after they are EJACULATED at the time of the male ORGASM.

The seminiferous tubules are the beginnings of a winding, devious conduit system for the spermatozoa which leads from the testes to the tip of the PENIS. The various seminiferous tubules become less coiled towards one end and form a network which is called the RETE TESTIS. From the rete testis, there emerge larger EFFERENT DUCTS which lead into the EPIDIDYMIS.

There is an epididymis in association with each testis. *The epididymis is a part of the seminal pathway.* The epididymis is a comma-shaped organ which lies snugly upon the upper and posterior surfaces of the testis. *It is a coiled tubular pathway which,* if it were straight, would be some 20 feet long. The tail of the comma-shaped epididymis is continued as the VAS DEFERENS, a straight tubular channel which forms one of the chief components of the SPERMATIC CORD which appears, together with certain blood vessels, to suspend the testes in the scrotum.

The epididymides function as storehouses for the

spermatozoa. These are said to live for two months in this location. It is believed that here a process of aging takes place which represents, to a certain degree, a ripening or maturing process in its early stages but eventually it proceeds to one of degeneration. The epididymis accordingly may be regarded as serving both as a ripening chamber and as a graveyard of spermatozoa.

In returning to the consideration of the internal secretory activity of the testes, the interstitial tissue or the CELLS OF LEYDIG secrete the male endocrine principle, called ANDROGEN OR TESTOSTERONE. This principle is typical of the secretion of an ENDOCRINE GLAND, which pours into the blood which bathes it one or more highly active chemical substances which are transported by the blood to more or less distant organs where these substances exert important physiologic functions. This androgen, testosterone, is responsible for all the characteristic sexual development of the male from childhood to manhood. During manhood testosterone is an active stimulator and regulator of all the functional elements of the male genital system.

The vas deferens, previously described as leaving the tail of the epididymis and coursing upwards in the scrotum, passes through the lower abdominal wall at the base of the scrotum through an opening known as the INGUINAL CANAL and enters the ab-

dominal and pelvic cavities. Here it proceeds to the region back of the urinary bladder. Behind it lies the rectum. In its location to the rear of the bladder, the vas deferens becomes dilated and is called the AMPULLA. This dilated portion of the vas deferens, like the epididymis, serves as a storehouse for spermatozoa. Associated with the ampulla, there is a SEMINAL VESICLE. The seminal vesicles are hollow pouches about 2 inches long and ½ inch wide. Each seminal vesicle is composed of a single coiled tube. The function of these vesicles is the supply of part *of the fluid contents to the seminal secretion. They* do not act as storehouses for the spermatozoa. The seminal vesicle and ampulla of each side are drained by an EJACULATORY DUCT. Each ejaculatory duct enters the URETHRA, which is the common urinary and seminal channel, just below the base of the urinary bladder at the level of the PROSTATE.

The prostate is about the size and shape of a horse chestnut. It lies in close relationship to the anterior wall of the rectum, as do the seminal vesicles. It contributes by way of its PROSTATIC DUCTS which open into the urethra an important, highly alkaline secretion to the seminal fluid.

The penis is the male external genital organ which functions as an organ for urination and sexual intercourse. It is traversed throughout its course by the tubular urethra. Small ducts of COWPER'S GLANDS and

the GLANDS OF LITTRÉ open into the urethra beneath the level of the prostate. Neither of these sets of glands contributes to the seminal fluid. The secretion of Cowper's glands lubricates the urethra after urination and renders, thereby, the urethral channel less acid for the passage of the seminal fluid. The glands of Littré are probably the source of the mucous secretion which appears at the MEATUS or the penile opening of the urethra during sexual excitement.

The penis contains tissue of an ERECTILE nature. This tissue is rich in blood vessels which form spongy blood channels. During sexual excitement, the channels become engorged with blood. This produces an ERECTION, which permits COPULATION or COITUS. Copulation normally ends in an orgasm during which the seminal fluid is ejaculated into the vagina and cervix of the wife. During ejaculation, the spermatozoa stored in the epididymides and the ampullae together with the fluid of the seminal vesicles and prostate are expelled by the muscular contractions of the tubular channels.

It is obvious from this discussion that if spermatozoa are to be present in the seminal fluid at ejaculation, the devious tubal channels which lead from the testes to the meatus of the penis must not be obstructed.

Since the fluid of the ejaculate constitutes its chief volume, absence of spermatozoa, due to blockage of

this ductular system or due to failure of normal spermatogenesis, is not reflected in any diminution in the

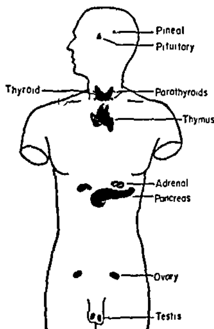


FIGURE 3. The locations of the various glands of the body. The diagram shows both male and female glands so as to serve for both sexes. The male has testes and the female has ovaries.

amount of the seminal fluid or by any changes in its gross characteristics.

The ENDOCRINE SYSTEM is composed of a number of single and paired glands. The PINEAL and PITUITARY glands lie within the cranial cavity.

The pituitary is situated about midway on a line joining the bridge of the nose with the middle of the bottom edge of the skull. This gland is known to act as a regulator or stimulator of the function of the other glands of the body, with the exception of the pineal and thymus. In addition, it is concerned with the contractions of certain involuntary muscles and with the regulation of the flow of urine.

The pineal gland lies somewhat above and further to the back of the cranial cavity than the pituitary. Its function, although the subject of much controversy, is not clearly known.

The THYROID, so-named because it is the shape of an oblong shield, lies just above the top of the breast bone and beneath the Adam's apple in the hollow of the neck. Here it lies in front of the windpipe. Its function is an important one in the body's nutrition. It governs the rate of the oxidation or burning of foods for energy requirements.

The THYMUS is situated above and in front of the heart in the upper narrowing portion of the chest cavity. Like the pineal gland, its function is controversial.

Beneath the thyroid gland and closely associated with it, are several pairs, and often more, of bean-shaped PARATHYROID glands. These play important functions in the body's ability to take calcium and phosphorus from the food and use these in building

bone and teeth and in keeping the muscular and nervous systems properly tuned to the demands made upon them.

Sitting upon the top of each kidney like cocked hats are the two ADRENAL glands. An adrenal gland has two parts: a covering or CORTEX and a core or MEDULLA. The cortex of the adrenal is concerned with the proper utilization by the body of the common essentials of life, salt, water and sugar. It also has important sexual functions and is related closely with the activity of the testes and ovaries. The medulla of the adrenals secretes a powerful substance, ADRENALIN, which stimulates the sympathetic nervous system, thereby speeding up heart action and raising blood pressure.

Lying behind the stomach in the abdominal cavity is the PANCREAS, a flat, elongated organ which extends diagonally across the upper abdominal cavity from the region on the right, where the small intestine drains the stomach, to the spleen on the left. The pancreas has an external secretion, pancreatic juice, which is an important digestive ferment and also an internal secretion, INSULIN, which is important in the body's ability to use sugar for its energy requirements.

The male sex glands, the testes, have been described. In addition to these, the pituitary, thyroid and adrenals have important rôles in reproductive

physiology. The pituitary controls and regulates the functions of the testes of the husband and ovaries of the wife. The thyroid, probably by way of connections with the pituitary and also by way of its important control over energy requirements, plays an important part in fertility and reproduction. The adrenal glands are thought to be the storehouses for the material from which the sex glands manufacture their characteristic internal secretions and, therefore for this reason and because they may prepare similar secretions themselves, they justifiably are considered sex glands.

in the female and runs through the roof of the vagina to drain the urinary bladder which overlies the upper anterior part of the vagina. The urethra in the female is solely a urinary channel.

Lying beneath the labia majora and circumscribing in part an almond-shaped area which contains the urethral meatus and vaginal introitus, are the two cockscomb-formed LABIA MINORA. The almond-shaped area between these is called the VESTIBULE.

The two labia minor join each other in the upper angle of the almond to hood the CLITORIS, a penile-shaped erectile organ which is one of the wife's chief erotic zones.

The entire area occupied by the external genital organs is called the VULVA.

Lying beneath the mucous membrane of the upper, more or less triangular part of the vestibule, there is a VESTIBULAR BULB on each side. These bulbs are composed of coiled masses of blood vessels which become congested and erectile during sexual excitation.

Buried just beneath the lateral walls of the vagina at the *levels of the hymenal fringes*, are two pea- or bean-shaped glands, the VULVO-VAGINAL OF BARTHOLIN GLANDS. These drain to the vestibule by small openings which lie directly in front of the remnants of hymen. A clear mucous fluid is secreted by these glands during sexual excitement.

The VAGINA is a hollow, distensible tube-like

pouch, lined by mucous membrane. It has a muscular wall. It extends from the introitus of the vulva to the CERVIX or mouth of the UTERUS. The vagina has three functions:

It drains menstrual discharges from the uterus;

It is the copulatory organ of the wife, and,

It serves as a passage way for the baby during labor.

The vagina is closely related to the urinary bladder in front and to the rectum behind. It is lubricated by the secretion of the cervical glands.

The uterus is an extremely muscular organ which is lined by a mucous membrane called the ENDOMETRIUM. It lies in the pelvic cavity between the rectum and the bladder. Its anterior wall usually rests upon the upper surface of the bladder. Being freely movable in the pelvic cavity, the uterus changes position with alterations in distension of bladder, changes in posture and even with breathing. Its shape is much like that of a flattened pear.

The upper and relatively triangular portion of the uterus, which lies entirely within the pelvis, is called the CORPUS or body. On the upper lateral margins of the corpus of the uterus are the uterine openings of the two FALLOPIAN TUBES. The corpus of the uterus is in communication with the vagina through its cervix and cervical canal

The portion of the cervix which lies within the upper part of the vagina appears much like a small

doughnut with a quite unnaturally small opening. This opening of the cervix is called the EXTERNAL OS. The vaginal portion of the cervix has a cartilaginous consistency.

The corpus of the uterus with its endometrial lining serves three general purposes:

It is the organ of menstruation;

It is the normal site for implantation and growth of the fertilized ovum; and,

It exerts the expelling forces of labor by virtue of its strong muscular coats.

The endometrial lining of the uterus undergoes striking alterations during the menstrual cycle. At the time of menstruation, most of this lining is shed and the formation of a new endometrial lining begins towards the end of flowing. These cyclic fluctuations in the endometrium are controlled by the endocrine secretions of the ovaries. The purpose of these changes in the endometrium during each menstrual cycle is the preparation of a suitable nest for the fertilized ovum, if pregnancy occurs.

Attached to each upper lateral wall of the uterus and communicating with the cavity of the uterus is a fallopian tube. These tubes, supported by the BROAD LIGAMENTS of the pelvis, run laterally across the pelvis for some three to six inches. The lateral ends of the tubes are dilated and have rather large openings into the pelvic cavity. About these openings is a

number of finger-like processes. These give to this end of the tube the name FIMBRIATED extremity. These finger-like processes make these openings of the tubes funnel-shaped in appearance. These openings of the tubes are approximated closely to the ovaries.

The fallopian tubes serve as important pathways for the ova and for the spermatozoa.

Near the fimbriated openings of each tube, there is an ovary. The ovary is about the size and shape of a small bantam egg. It has a glistening white covering which is studded by scars left by the previous discharges of ova. Shining through this covering are small blister-like areas which are the nests of ova being prepared for discharge or OVULATION.

The ovary is the female sex gland. It has an external secretion, its ova, which are the female germ cells. It has internal secretions which are responsible for all the endowments of femininity and which govern the growth and development of the fertilized ovum.

The ovum is a large single cell, which is just at the lower limit of visibility with the naked eye. When, however, as is customary after ovulation, a few layers of cells which formed its nest cling to it, this mass of cells may be seen as a pinpoint size object. Under the microscope, the ovum appears egg-shaped. It carries all the germinal contributions of the wife which are her hereditary endowments to the offspring.

A cycle of striking alterations occurs in the ovary during each menstrual month. At the end of menstrual flowing, changes are initiated by the ovary for the preparation of an ovum for discharge or ovulation some ten to twelve days later. A cluster of cells, called GRANULOSA CELLS, begins to multiply. These

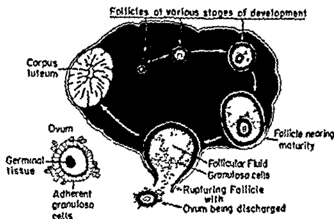


FIGURE 5. A cross section of the ovary showing the stages in the development of the ovum, its discharge and the corpus luteum. A large scale drawing of an ovum is included.

form and line a nest, which is called a FOLLICLE, and which contains clear fluid and an ovum. The follicle is some distance from the covering of the ovary when these growth changes begin. As the development of the follicle nears completion, it moves gradually outward in the direction of the glistening surface of the ovary. Eventually, its thin wall shines through the surface of the ovary like a small blister.

When the ovum is completely mature, this follicle ruptures and the ovum is discharged into the free pelvic cavity. It does not remain long in the pelvic cavity. It is attracted to the fimbriated end of the tube and passes into its funnel-shaped opening. The mechanism of this attraction is probably a negative pressure or current set up by the swishing, suction-creating motions of the many hair-like processes, called CILIA, which line the tubes.

After ovulation the rend in the surface of the ovary is plugged by a blood clot and healing follows. Strange things happen, however, to the cells which had formed previously the nest of the ovum. These granulosa cells become larger, take on a yellowish color and increase in number to fill the space left when the follicle ruptured. They are now known as LUTEIN CELLS and because of the yellow appearance which this area of the ovary has, it is called the CORPUS LUTEUM or the yellow body. The corpus luteum begins to degenerate about the time menstruation is due but if the ovum has been fertilized and a pregnancy has been established, the corpus luteum does not degenerate until during the latter part of pregnancy.

Both the granulosa cells of the developing follicle and the lutein cells of the corpus luteum have internal secretions.

The granulosa cells secrete ESTROGENIC sub-

stances or ESTROGENS. Estrogens are the substances which give to the wife all of her feminine attributes. These were responsible for all of the characteristic alterations of her adolescent years. The growth and development and, to a great degree, the functional activity of her genital organs are due to influences exerted by these estrogens.

The lutein cells of the corpus luteum secrete not only additional estrogens but also a specific secretion of their own, PROGESTIN. Progestin is concerned with the anticipatory preparation of the uterus for pregnancy. It brings about changes in the endometrium designed to prepare a likely and suitable nest for the reception of the fertilized ovum. If pregnancy does occur, progestin concerns itself with the assurance of proper nourishment and protective sheltering of the developing pregnancy.

The ovum, after having entered the fimbriated opening of the fallopian tube, is propelled slowly toward the uterine cavity by the ciliary mechanism previously described.

In the meanwhile spermatozoa, deposited in the cervix at the time of the husband's orgasm, move through the cervical canal and into the uterine cavity by virtue of their own locomotory equipment. Some of the spermatozoa are able to *find the uterine openings* of the fallopian tubes and entering these, start travelling outwards in the tubes. The spermatozoa

are confronted in their tubal journey with the necessity of travelling against the current set up by the tubal cilia. The more vigorous of the spermatozoa are able, however, to make forward progress. Spermatozoa usually reach the ovum while it is still quite near the fimbriated opening of the tube.

It has been estimated that it takes spermatozoa only about one hour to travel from the cervix to the fimbriated extremity of the tube. On the other hand, it is said that the fertilized ovum requires three days to negotiate its tubal journey. Having reached the uterine cavity, the fertilized ovum is said to require another three days to find a suitable nest, wherein four days later it becomes attached for further growth and development Accordingly, implantation of the fertilized ovum is completed ten days after ovulation and not until within four days of the time of expected menstruation.

The burrowing of the fertilized ovum into the endometrial lining of the uterus is associated not infrequently with some bleeding, which is called IMPLANTATIONAL BLEEDING. This bleeding is usually too slight to be noticed, but at times it may be of sufficient amount to simulate a menstrual period, thereby, perhaps, causing pregnancy to be unsuspected until the next month

The itinerary of the spermatozoon in the wife's generative organs is as follows deposited in the

cervix, it proceeds through the cervical canal, into the uterine cavity, thence through the uterine openings of the fallopian tubes and through the tubes to meet and fertilize the ovum near the abdominal opening of the tube.

The course of the ovum is this: following discharge from the ruptured follicle of the ovary, it lies unattached in the pelvic cavity until it is attracted to one of the fimbriated openings of the fallopian tubes, when it is carried slowly through the tubes by the action of tubal cilia and eventually, after having been fertilized by a spermatozoon, it reaches the uterine opening of the tube and passes into the uterine cavity, in the lining of which it eventually becomes implanted.

The discussion of the husband's endocrine system applies equally to that of the wife with exception, of course, of the striking differences in the functions of their sexual glands. These functions have been described. The pituitary gland is charged with the rôle of regulating the cyclic phenomena which occur in the ovaries during each menstrual cycle. A precise coördination of these changes is essential for the discharge of healthy ova as well as for the normal endocrine functions of the ovary. The thyroid gland, both by its close functional associations with the pituitary gland and its dominant rôle in the control of energy production, exerts significant influences upon the external and internal secretions of the ovaries.

Chapter Four

Examinations of the Husband

WHAT examinations are required of the husband of a childless couple? What specific data are secured from these examinations?

Intelligent coöperation in these studies necessitates that the husband and wife have a clear insight into the rationale of the entire diagnostic study and the significance of the data secured. A careful interpretation of the complete findings of these examinations renders possible a scientific prediction as to ultimate expectancy of salvage of procreative functions and delineates a rational plan of treatment, when it is necessary.

The first step in the husband's survey is that of recording all significant medical facts about his life, health, habits and his hereditary background: this is the medical history. It should be likened to hearing the evidence in a legal proceeding. These facts, while not certified by oath, should be documented with

the same respect for accuracy and fidelity. A sincere, truthful and whole-heartedly detailed history is the most valuable of all the elements in any diagnostic survey.

Too many patients approach their examinations with the attitude of putting the physician "on the spot," perhaps to test his mettle; their point of view appears to be this: "here-I-am-tell-me-what's-the-matter — don't-ask-me—that's-what-I-came-to-you-for." This type of behavior combined with the wilful withholding of facts or lying about them is difficult to understand. Every bit of information about the patient's past and present health may be of some help to the physician. If possible, the examinations and opinions of other physicians consulted and their recommendations should be made available. Frequently, a helpful answer will follow the physician's question to the patient: "What do you yourself think is the trouble?"

In this ingathering of historical facts, no false modesty, or assumed delicacies of feeling should prevent a clear delineation of the sexual life of the couple. It is usual experience that women are franker in this regard than men.

Having secured all the worthwhile historical data, the physician proceeds with a general physical examination. It should be realized that this examination of

the husband, as well as a similar one of the wife, will discover very rarely the cause or causes of sterile mating. Notwithstanding, a most meticulous physical inventory should be taken The sexual efficiency, perhaps even more so than other functions of the body, is undermined by constitutional diseases or impairment. The recognition of these by examination may lead to medical or hygienic approaches which will enhance ultimately the fertility of the individual.

The historical data previously recorded and the findings at the time of general examination may lead to special consultations and studies, as electrocardiographic studies for a better definition of the condition of the heart, gastrointestinal roentgenograms (x-rays) for the investigation of symptoms referable to the digestive system, etc. Although the results of these special studies, as a rule, may not be applied directly to the solution of the immediate problem of childlessness, significant applications of these data may be permitted in the ultimate prognosis or in therapeutic endeavors.

Included in this general physical inventory there is special attention to the genital and endocrine systems. Careful inspection of the penis is made for tell-tale evidences of disease or for possible developmental defects which may interfere with normal INTROMISSION. The testes are examined for any pathologic

tenderness, changes in consistency or size. (A number of diseases causes atrophy and serious impairment of testicular function.)

The epididymides are palpated carefully for thickening or swelling, the result of infections or diseases which might close their openings and block the passage of spermatozoa from testes to the meatus of the urethra.

The vas deferens of each spermatic cord is examined for knots or beading, which might indicate similar obstruction to the spermatic pathway.

Since several important male organs lie within close proximity of the rectum, as the previous discussion of anatomy has indicated, a rectal examination is an important part of this survey. It permits examination of the prostate gland, the seminal vesicles and Cowper's gland. By careful massage or "stripping" by the examining finger of the physician, secretions from these glands via the penis may be secured for microscopic studies.

When diseased, Cowper's glands are felt by the physician as two small masses which lie just above the circular or SPHINCTER muscle which guards the lower end of the rectum or ANUS.

The normal prostate gland may be felt readily by rectal examination; tenderness and enlargement of it indicate disease. The seminal vesicles are not palpable unless they are swollen and distended due to

disease. Infected prostatic and seminal secretions may interfere with the healthy state of the seminal fluid, since these secretions are integral parts of this fluid.

The endocrine survey, in addition to the direct palpation of the testes, comprises a general physical inventory of the husband for any evidences of glandular impairment. Most of the significant evidence comes from disturbances in the functions of the testes, pituitary and thyroid. The nature of an individual's skeletal growth, the localization of his fat pads, the distribution and amount of body hair, or the condition of his skin may suggest glandular disease.

Quantitative determinations of the endocrine function of the pituitary gland and testes occasionally may be advised. In this event the physician may request the collection of complete 24-hour specimens of urine for some three to four days for this purpose. These are valueless unless the husband realizes the necessity for saving *all* his urine as he is instructed. In special laboratories the collected urine is put through various complex and time-consuming procedures of highly technical nature. The results provide data upon the efficiency of the GONADOTROPIC (gonad-stimulating) function of the pituitary as well as upon the levels of endocrine activity of the testes.

A study of the activity of the thyroid gland is done in all cases. The determination of the BASAL

METABOLIC RATE, often called BMR, is carried out b a breathing test in which the amount of oxygen cor sumed during a given period of time is calculatec This test gives information regarding the thyroid' activity in energy production. The husband should b in an absolutely rested and fasting condition for thi test. Accordingly, instructions which are given fo the necessary preparations for the test should be fol lowed closely.

Although actual measurements of the function o the pituitary gland are often highly desirable, at present, no simple methods exist for making these. However, roentgenograms of the SELLA TURCICA (or Turkish Saddle) may show at times some evidences of disease of the pituitary. The sella turcica is the saddle-shaped bony case about the pituitary. When tumors or serious diseases of the pituitary occur, the bone of the sella turcica is eroded and destroyed; this damage may be identified by roentgenograms. These roentgenograms usually are done as a matter of routine.

Other examinations which may be done in regard to the activities of the glands of the endocrine system include various studies of BLOOD CHEMISTRY: studies of samples of blood may be examined for their contents of CHOLESTEROL (index of thyroid function), of CALCIUM and PHOSPHORUS (parathyroid function) or of SUGAR (pancreatic function).

The usual laboratory studies, which form an integral part of every general examination, are done. These include determinations of the HEMOGLOBIN and RED BLOOD CELL COUNTS for the diagnosis of anemia and URINALYSIS for evidences of kidney or bladder troubles. Blood tests for syphilis (WASSERMANN, KAHN OR KLINE TESTS) are essential to every examination. The existence of syphilis should lead to discontinuation of all further sterility studies until the condition is cured lest syphilitic offspring might result.

The most important of all of the examinations done upon the husband is his SEMINAL STUDY. This study is made most satisfactorily after a suitable period of abstinence or continence from sexual activity. NOCTURNAL EMISSIONS should be regarded as sexual activity. A period of continence of 4 to 7 days assures recovery of seminal values following the temporary diminution in these which is associated with emptying of the seminal reservoirs.

It is necessary that a fresh specimen of seminal fluid be examined. The use of a CONDOM or rubber sheaths for the collection of the specimen is unsatisfactory since many condoms contain chemicals which have injurious or destructive actions on the spermatozoa, in other words, these may be SPERMATOCIDAL in nature. If the use of a condom for collection of the specimen becomes expedient or necessary, it should

be washed thoroughly with soap and thereafter rinsed carefully with plain water.

Ideal specimens for examination are secured by MASTURBATION. The seminal fluid is spilled directly into a clean porcelain or glass dish. Good specimens may be secured also by the normal sexual act, the penis being withdrawn prematurely and the ejaculate being caught in a clean wide mouth bottle. The chief disadvantage of this method is that some of the specimen is often lost, the result being that estimates *as to the total amount of fluid are not accurate.*

If specimens are not collected in the physician's examining suite, these should be brought promptly, within the first hour, to him for examination. Leakage of any of it from its container should be avoided. No necessity exists for trying to keep the specimen warm other than putting the container in one of the inner pockets of the clothing. The older advice to immerse the container of the fluid in warm water leads to overheating or actually cooking of spermatozoa by the overly zealous.

Various observations are made by the physician upon the seminal specimen:

The volume of the specimen is measured and recorded.

A drop of slightly diluted fluid is placed on a glass slide and is examined directly under the microscope in order to evaluate the activity or motility of the spermatozoa. The type of motility is studied also since it is known that it

is only the purposeful forward motion which is effective in carrying the spermatozoon to its meeting with the ovum.

An actual counting of the spermatozoa next is done.

This counting is similar to the red blood cell count. The seminal fluid is diluted with a solution which immobilizes the spermatozoa, thus permitting them to be counted. The number of spermatozoa present in each cubic centimeter of fluid is an important index of fertility.

Then a thinly spread preparation of the seminal fluid is made on a glass slide and this is stained suitably for microscopic examination The purpose of this examination is a study of the normality or abnormality in the development of the spermatozoa. Many developmental deformities arise from abnormalities in spermatogenesis and of maturation and aging.

To test the endurance or viability of the spermatozoa, another series of observations is made. Small amounts of the fluid are sealed hermetically in very small glass tubes in order to prevent drying. Then periodically over a period of 24 hours, some of these tubes are broken and their contents are examined to see if the spermatozoa remain active. These tubes are kept at body and ice-box temperatures during the period of examination.

The average normal values for these various observations upon the seminal fluid are these:

Volume: usually about 4 cubic centimeters.

Motility: usually 80 to 95 per cent of the spermatozoa is actively motile.

Structural characteristics: 80 per cent or more of the spermatozoa should show normal development.

Number: this ranges between 40,000,000 and 100,000,000 per cubic centimeter; often it is greater than these limits.

Endurance: spermatozoa remain actively motile for 12 to 24 hours or longer when kept at body and ice box temperatures.

Often as a part of the seminal examination, the compatibility of the seminal fluid of the husband and the cervical secretion of the wife is studied. This is done by layering a drop of the seminal fluid and a drop of the cervical mucus on a glass slide and making a microscopic examination. If incompatibility, usually due to infection, exists, the spermatozoa lose their motility and are unable to penetrate the mucus. Their normal function depends upon their ability to penetrate this mucus in order that they may enter the uterine cavity.

Another study which involves examination of the husband's seminal fluid is the so-called POST-COITION TEST. Its purpose is information regarding the normality of the inseminational process. Since this test does not require an office visit by the husband, but does require one by the wife, its details are described in the discussion of her examinations.

There are other special examinations which are not done routinely, but which are extremely important in relatively rare instances.

When no spermatozoa are found in the seminal

fluid (ASPERMIA), it is essential for the physician to decide whether this is due to the fact that none is formed by the testes or whether they are formed but are blocked in their passage by obstructions in the ductular pathway. Data previously obtained from the genital or endocrine surveys may indicate one or the other of these alternatives but special examinations are necessary to prove actually the true diagnosis. To make this diagnosis TESTICULAR and EPIDIDYMAL PUNCTURES or a TESTICULAR BIOPSY are necessary. Both of these are simple, relatively painless office procedures.

In general, testicular and epididymal punctures are done in this way. A small area of the overlying scrotum is painted with antiseptic solution and anesthetized by the injection of a few drops of novocaine. Then the physician, using a small syringe attached to which is a small hypodermic needle, plunges the needle into the epididymis and exerts negative pressure with the syringe to secure seminal fluid if any is present. If none is obtained, he then repeats the procedure, but this time plunges the needle into the testis. If microscopic examination of the material sucked up by the syringe shows the presence of spermatozoa, their absence from the seminal fluid is related to some blockage of the ductular pathway.

The testicular biopsy is a more valuable test than those just described. It is done in general as follows:

Following antiseptic preparation and anesthetization of the overlying scrotum, a small incision about one-half inch in length is made in the scrotal skin to expose the testis. The coating of the testis barely is pricked with the knife. Slight pressure on the testis then forces out a small amount of frothy looking seminal tissue. A small shaving, no larger than a fifth of a thin dime, is taken from this extruded tissue for microscopic study. A single stitch is placed in the incision in the scrotum; a light cotton dressing, sealed with collodion, is applied; an athletic testicular supporter is supplied; and the husband is able to resume his duties.

When the tissue removed by biopsy has been prepared for microscopic examination, study of it will demonstrate whether or not normal spermatogenesis is occurring. If so, any absence of the spermatozoa from the seminal fluid is due to ductular blockage.

Testicular biopsy is a valuable diagnostic procedure not only when there are no spermatozoa in the seminal fluid, but also when there are a very few present. In these latter cases, valuable information is supplied regarding any defects in the formation of spermatozoa.

When obstruction of the ductular tract is suspected or proven, the physician will desire to find out its location in order to treat it properly and in order to be able to give advice as to the likelihood of his being able to correct it. One of the diagnostic measures he

employs is that of VASOPUNCTURE. The method of this test is the following:

With a small needle on an ordinary syringe loaded with a RADIOPAQUE liquid (one which casts a shadow on a roentgenologic examination), the physician inserts the needle into the vas deferens of the spermatic cord and injects the radiopaque liquid into it. By subsequent roentgenologic examinations, he may locate the site of the obstruction by observing where the passage of the radiopaque liquid was blocked. This method may locate blockage in the vas deferens and in the ejaculatory ducts

When obstruction of the ejaculatory ducts is suspected, URETHROSCOPIC CATHETERIZATION of these ducts may secure significant information. The urethroscope is a lighted tubular instrument which, upon insertion into the urethra, permits direct inspection of the openings of the ejaculatory ducts. Small rubber tubes, called catheters, under direct vision are inserted into these ducts to determine patency or to prove obstructions. Repeated passages of these catheters may relieve the obstruction by producing dilatation of the ducts. If an obstruction exists, it may be visualized by the injection of a radiopaque solution and subsequent roentgenologic examination.

Chapter Five

Examinations of the Wife

WHAT is the nature of the wife's examinations? What specific data are secured from them?

As in the case of the husband, a meticulous medical history of the wife is taken. Important parts of this history are complete records of the wife's sexual and marital histories.

A normal course and orderly process of her previous adolescent differentiative changes suggest normal endocrine functions of her ovaries. The time of her MENARCHE (first menstrual period) is recorded.

Definite records of any significant irregularities or abnormalities of the menstrual function should be given to the physician. Any unusual symptoms associated with menstruation should be mentioned.

The physician always will ask when the last menstrual period occurred. He will want to know *the days of the month* when bleeding was present, not the days

of the week. He will desire also the calendar dates of several other previous menses. The patient should be prepared to give accurately this information. Every wife should keep a careful record of her menses. Such a record would convince her of the error of the casual statement made by many women that they are "absolutely regular." None is.

It is highly desirable also that the wife be able to give the physician some idea as to the amount of flowing experienced. This is best gaged by a statement as to the estimated number of well saturated hygienic pads used. A simple tabulation of these menstrual data, as the following, is requested by many physicians and is received gratefully by them·

April 15, 3 pads, saturated
April 16, 4 pads, saturated
April 17, 3 pads, half saturated
April 18, 1 pad, half saturated
April 19, 1 pad, only stained

A neatly and compactly kept record of this sort when incorporated into the patient's office history, forms a valuable part of its data. The physician may request that these records be sent him each month while the patient is under his care and supervision.

It is advisable that the wife understands the system of dating the menstrual cycle which the physician uses. When he speaks of the first day of the cycle, he

means the first 24 hours of menstrual bleeding. When he refers to the last day of the cycle, he is designating the 24 hours immediately preceding the onset of menstrual bleeding. When he describes a cycle as a 28 day one, he means that 28 days elapse between the day of the onset of one menstrual period and the day of onset of the *next menstrual period.* When he speaks of the middle of the cycle, he means that time midway between the time of onset of the last menstrual period and the expected time of the next menstrual period. If the wife learns this system of dating events in terms of the menstrual cycle, she and her physician will speak the same scientific language and many misunderstandings will be avoided.

The marital history should be given in a forthright manner. If any sexual incompatibilities exist, the wife should mention these. The nature of contraceptives previously employed should be given and, of course, the time when these were discontinued should be stated, since this information will date the duration of sterility, if the contraceptive regime were a reliable one. Information regarding the sexual habits of the couple usually is secured more readily from the wife.

As a rule, about this time in the history taking a discussion comes up regarding the optimal time of the menstrual cycle for conception. This is the converse of the "safe period" method of contraception. De-

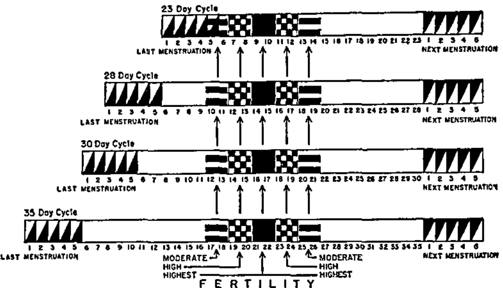


Figure 6 Fertility charts. These show the usually accepted data on the most fertile days of the menstrual cycle. It should be observed that these days are dated not from the last menstrual period but from the time the next period is expected Studies of basal rectal temperatures (q v) may indicate that a wife's ovulation does not follow this general schema.

spite the extreme degree of publicity which has been given to this system, many couples are found to be quite confused about the whole matter. This confusion is attested by their practicing of the method in complete reverse but, at the same time, in the full belief that they had been informed correctly on the subject.

Most clinical information supports the belief that fertilization is most likely to occur from coitus at the middle of the menstrual month, providing that the cycle is 28 to 30 days in duration. If the cycle is significantly longer or shorter than these limits, the statement above is not true. *In reality, the true general statement is that the optimal time of fertility is 14 to 15 days before the next menstrual period is due.* There are several days before and after this arbitrary day, when fertility is doubtlessly high. The wife whose menses are highly irregular cannot use this system. (Daily studies of basal rectal temperatures, discussed later, may be valuable, however, in dating her ovulation.)

The wife should volunteer information regarding any soreness, ulceration, boils or abscesses about the genital organs or any unusual vaginal discharge. She should tell her physician regarding any episodes of lower abdominal or pelvic tenderness or pain, especially if these were accompanied by low grade fever. These may have been symptoms of an acute gonor-

rheal infection. Gonorrhea is one of the more serious causes of sterility in woman.

Likewise every effort should be made to give the physician a clear statement in regard to the nature of any previous abdominal or pelvic operation. It is all too seldom that a wife knows what was done to her at the time of her operation.

Women, in general, have had too much surgery done on their female organs. In part, it has been their own fault: they have been too willing to submit to these procedures, often without even seeking another competent consultant's opinion. Operations which were destructive to their procreative functions have been done, when these organs might have been spared had a less radical operation been done or, instead, had non-operative treatment been used.

Every woman should make clear to her surgeon, in advance of operation, her procreative ambitions. These may be respected and, at the same time, adequate treatment may be carried out. There is a very small list of diseases or conditions in woman which requires pelvic surgery. Following any abdominal or pelvic operation, women should secure from their surgeons written statements as to what was done and the reasons for doing so. This information is of considerable service to physicians whom she may consult later.

Following the securing of a complete and ample history on the wife, the physician will proceed with a general and inclusive physical examination. The broader considerations of this examination were discussed when the husband's examinations were reviewed. Any constitutional disease and many physical impairments may interfere with the reproductive function; improvement of these, when encountered, *may enhance the wife's fertility. In an occasional instance*, diagnostic studies, which do not seem particularly germane to the sterility problem, may uncover physical weaknesses or hereditary factors which might render pregnancies hazardous or undesirable. Under these circumstances, no further endeavors in regard to the presumed sterility of the couple would be advised. In this general examination special attention is paid to the gynecologic and endocrine surveys.

The physician in his gynecologic survey of the wife may encounter important findings which shed light upon the sterility of the couple. He inspects the external genitals of the vulva for scars, ulcers, swellings or abscesses significant of infection. Some of these may indicate syphilis, which, if present, should result in a delay of any further investigative endeavors until the condition is cured. Swellings or knots in the vulvo-vaginal glands may indicate old gonorrheal infection, other evidences of which may be en-

countered as the examination proceeds.

After inspection of external genitals, the physician proceeds with the internal or VAGINAL EXAMINATION. He inserts an instrument called a SPECULUM into the vagina for the purpose of inspecting its walls, its discharge and the cervix of the uterus. The walls of the vagina may be reddened and inflamed; this is caused by infection Vaginal infection *per se* does not cause sterility but its presence may compel the physician to discontinue any further sterility investigations, until the infection is cleared, lest he may spread the infection during subsequent examinations.

The physician is not concerned over the vagina being acid for he knows it should be so normally. Many wives have misconceptions about this and think that an acidity of the vagina should be combatted by soda douches, as an aid to the occurrence of pregnancy. Most physicians believe that the spermatozoa which are deposited in the vagina proper play no rôle in fertilization and that direct insemination of the cervix at the time of the husband's orgasm is the normal mechanism. It is true that the normal acidity of the vagina rapidly kills or damages the spermatozoa deposited there. There are circumstances wherein, due to displacements of the cervix or deformities of the penis of the husband, direct insemination of the cervix is not possible. In these cases efforts to utilize the spermatozoa spilled on the walls of the vagina for

fertilization may be advised and the measures advocated include the use of soda douches just prior to intercourse.

With the speculum in place, the physician inspects the cervix for evidences of infection. This is more serious than infections of the vaginal walls, for infection of the cervix may produce acidity. The cervical canal should be alkaline for the congenial reception of spermatozoa. If he suspects infection, he tests the inside of the cervical canal with a piece of blue litmus paper which turns red if there is acidity.

The cervix is usually kept plugged except during menstruation by a wedge of mucus. This mucus is examined. A piece of it is removed and used for the compatibility test with the husband's seminal fluid. This test has been described (see page 46). Another portion of the mucus is prepared on a glass slide, stained suitably and studied for pus cells and other evidences of infection. At times the external opening of the cervix is very small. Under these circumstances the physician may anticipate finding an infected plug of mucus behind the opening. This infection may be related to poor drainage of the cervical canal and uterus.

Now, removing the speculum, the physician proceeds with his BIMANUAL examination of the internal female organs. With the fingers of one hand in the vagina and the other hand pressing firmly on the

lower wall of the abdominal cavity to steady the pelvic organs and to approximate them to the vaginal hand, the physician seeks to outline the internal genital organs.

The uterus normally is felt towards the front of the pelvic cavity and in midline. If the patient has not emptied completely her bladder prior to examination, it is often impossible for the physician to do a satisfactory examination. The normal uterus is freely movable without pain. Immobilization of the uterus usually indicates some infection in the pelvic organs.

Not infrequently the uterus is found to have toppled backwards and to lie in the back of the pouch of the pelvic cavity where it is in close relationship to the rectum. It is said then to be RETRODISPLACED. In the past many physicians have placed considerable emphasis upon these displacements and have tended to relate many of the ills of woman to these. Accordingly, many women have had useless operations to right their misplaced uteri. Now it is realized that this condition is harmless. Retrodisplacement plays a very minor rôle in sterility. If the cervix is rotated badly by a displacement, direct insemination may be impossible but there are ways of circumventing this which are less harmful and radical than a major operation to suspend the uterus.

Normal fallopian tubes cannot be felt on bimanual pelvic examination because they are soft and non-

tender. When there is serious infection of the tubes, they are felt as tender, firm cords coursing out from the sides of the uterus. Infection of this severity blocks the tubal channels and prevents the normal passage of ova and spermatozoa. This produces absolute sterility of a serious type.

Usually if the wife relaxes well during her bimanual examination and is not too fat, both ovaries may be felt. These normally are not unduly tender, and are freely movable. If they are moderately enlarged and tender, infection is likely. Tumors of the ovaries produce at times very large masses.

The wife should not expect the physician to be able to tell much about the function of her ovaries by simply palpating them on bimanual examination. Special tests are necessary to define the normality or abnormality of ovarian function.

During the general and gynecologic examinations, the physician may secure valuable information regarding the function of the endocrine glands. Underdevelopment of the breasts, scarcity of typical feminine fat padding with resulting angularity of the body rather than the graceful curves of the normal woman, unusually long arms and legs, scarcity of sexual hair and smallness and poor development of the external and internal genital organs suggest inadequate estrogenic function of the ovaries. Failure of the ovaries to supply ova for fertilization is associated usuall·

with this grade of ovarian underfunction. Some women, however, who show none of these signs of estrogenic deficiency, and who even bleed regularly each month, may possess ovaries which do not supply ova for fertilization. Accordingly it becomes necessary to study the ovarian function in detail to be sure that it is normal.

Unlike the examination of the husband, it is impossible to study directly the germ cells of the wife; indirect evidence upon the normality of the external secretion of the ovaries must be secured by proving that the levels of their internal secretions are normal or abnormal. The special tests for ovarian function will be described a little later in this discussion, to maintain the order of the entire survey in its proper perspective.

The function of the thyroid gland is investigated routinely in the wife as in the husband by determination of the basal metabolic rate (BMR) by the breathing test.

Actual measurement of pituitary function is highly desirable especially in the wife but, unfortunately, no satisfactory simple methods for this are available. Roentgenograms of the sella turcica are done routinely and, occasionally, yield significant data.

Also at times, when estrogenic deficiency of the ovaries is suspected, roentgenograms of the hand and foot are made for the purpose of ascertaining the de-

gree of osseous development. Severe ovarian failure interferes with the normal maturing of skeletal bones.

Special blood chemistry studies, as described in the study of the husband, may be required as a part of the wife's examinations.

The usual routine laboratory studies of blood and urine are done as a part of the wife's surveys.

The TUBAL TEST is the most important of all the studies done upon the wife. The purpose of this test is the determination of whether or not the fallopian

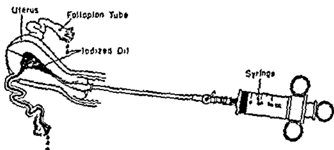


FIGURE 7. A diagram which shows how a tubal test is done.

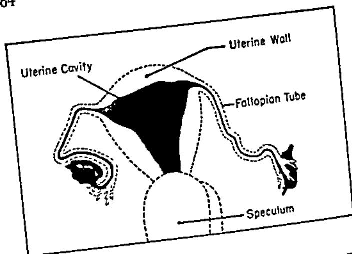
tubes are open throughout their course. Patency of these tubes is necessary for transportation of the ova and the spermatozoa.

In order to avoid bleeding and possible damage to the endometrium, the test is not done towards the latter part of the menstrual cycle. The time set for performance of the test is restricted to the first 3 to 7 days after the cessation of the menstrual period.

The wife should be sure that her appointment with the physician for the tubal test fulfills this time requirement.

The details of the test, as done in the Duke Clinic,* are these. After the wife has received a cleansing douche, she is placed in the usual position for a vaginal examination. The physician inserts a sterile speculum into the vagina to visualize the cervix of the uterus. He then paints the cervix with a mild antiseptic solution which, due to its alcohol content, may at times cause slight smarting. Using sterile gloves and sterile instruments, the physician grasps the cervix with a forcep called a TENACULUM. This causes the wife to have a pinching sensation. The tenaculum steadies the cervix during the remainder of the examination. A curved hollow metal tube, called a CANNULA, then is inserted into the cervical canal. This

* There are many variations in the technic of the tubal test. Many physicians use modifications of the Rubin test, which employs the injection of gas rather than iodized oil and reserve the use of oil for those cases in which blockage is encountered When gas is employed, [illegible] [illegible] to keep careful recordings of pressure relationships. Little dependence should be placed upon the results from a very simple technic used by some physicians in which air is injected into the uterus with an atomizer or blood pressure instrument bulb, patency of the tubes being diagnosed if gurgling of the air is heard by stethoscopic examination over the abdomen at the level of the abdominal openings of the tubes



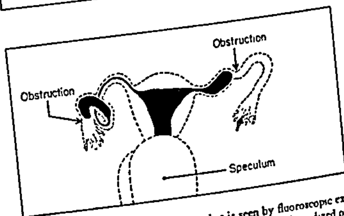


FIGURE 8. Diagrams which indicate what is seen by fluoroscopic examination during the tubal test. The shadows cast by the iodized oil are represented by black areas.

cannula carries a wedge-shaped bulb of solid rubber which fits into the external os of the cervix and seals it tightly. The end of the cannula opposite from the one in the cervix has a device by which the cannula may be connected to the tenaculum which grasps the cervix. This connection maintains the cannula in its proper position. The end of the cannula which is not in the uterus contains a connection for any ordinary glass syringe. The syringe, loaded with sterile iodized oil, is connected to the cannula

When the patient has been arranged properly under a fluoroscope, the oil contained in the syringe is injected slowly into the uterus. The purpose of the iodized oil is to permit visualization of the uterine and tubal cavities. The oil casts shadows when viewed by a fluoroscope. Without the oil the uterus and tubes cannot be seen under the fluoroscope.

The patient may experience some slight uterine cramping as the cavity of the uterus is distended by the oil. This cramping is similar to that often experienced during menstruation. The physician usually will prepare the patient for this discomfort and ask her to inform him when it occurs in order that he may lessen the pressure being made on the piston of the syringe.

The physician follows the progress and course of the oil by shadows visible on the fluoroscopic screen At first the uterine cavity is seen to fill and appears

as a triangular shadow. Then if the tubes are open, the advancing shadow of the oil may be followed throughout their courses until free drops of oil are seen to drop from their abdominal ends into the pelvic cavity. This is the objective proof that the tubes are open. At this point a roentgenogram is made for permanent record and more detailed study. Usually another roentgenogram is made some hours later to evaluate "scatter" of the oil within the abdominal cavity. If no "scatter" occurs, tubes are not open.

When the tubes are blocked, the progress of the oil is stopped at that part of the tubes. If blockage exists at the uterine openings of the tubes, no part of the tubal pathway is visualized.

All of the discomforts described as incidental to the tubal test are minor ones. No anesthesia or sedatives are necessary for its performance. The patient is able to leave the physician's office directly after the test is completed. Occasionally there may occur some slight uterine bleeding for a day or so after the test. This should be a matter of no concern to the patient. No ill after-effects or reactions to the test are to be anticipated by the patient.

Perhaps the next examination the physician does will be the POST-COITION TEST. The purpose of this test is an evaluation of the ef
The examination is a sim
structs the wife to
traceptive measures and t

as soon as possible, within an hour if possible, for the examination. It goes without saying that the wife should not take a douche before this examination. She should not be concerned because some of the seminal fluid may drain from the vagina. This will be the fluid which is deposited in the vagina and not that ejaculated directly into the cervix.

In the physician's office she is prepared for vaginal examination and a speculum is inserted to visualize the cervix. By means of small swabs of cotton or a small syringe, fluid is obtained from the cervical canal and examined promptly under the microscope. If living spermatozoa are found in this fluid, no error in insemination is operative.

If no spermatozoa are found in this fluid, this error may be due to abnormal cervical reception caused by uterine displacements or it may be due to abnormal delivery of spermatozoa by the husband. Data secured elsewhere in the diagnostic surveys will indicate usually whether the responsibility is the wife's or the husband's.

Another important study in the diagnostic survey is the ENDOMETRIAL BIOPSY TEST. The purpose of this examination is a definition of the level of ovarian function. The test must be done at a specified time of the menstrual cycle if pertinent information is to be secured. Since the aim of the biopsy test is the acquisition of data upon the condition of the endometrium at the onset of menstruation, the tissue for

examination must be obtained at that time. Because of the fact that sloughing of the endometrium, which characterizes menstruation, does not begin until about 24 hours after the onset of bleeding, the tissue may be secured with advantage any time within the first 12 to 18 hours after bleeding begins.

The details of the biopsy test are these. The wife is prepared in the usual manner for pelvic examina-

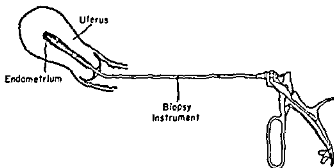


FIGURE 9. A diagram which shows how the endometrial biopsy test is done.

tion. Since she is bleeding, no douche is given. A speculum is inserted into the vagina and the cervix is visualized. The cervix is painted with an antiseptic solution, as in the tubal test. The cervix is grasped, as in the tubal test, with a sterile tenaculum. Then a biopsy forcep, which has a curved shank, similar to that of the cannula of the tubal apparatus, is passed into the cervix and well to the top of the uterine cavity. Bits of endometrial tissue are taken from two

or three locations on the uterine walls with the jaws of the forcep. The introduction of the forcep into the uterus will produce some cramping but the dis-

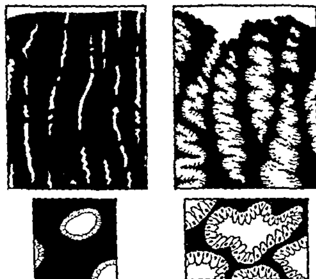


FIGURE 10. The appearance of the endometrium at the end of a sterile cycle (left) and at the end of a fertile cycle (right). The smaller inserts indicate how these endometrial specimens look under high-power microscopic examination.

comfort from this test is not enough to require anesthesia or sedation. Upon withdrawal of the biopsy forceps, the tissue held in its jaws is removed and is prepared for microscopic study.

When the tissue is studied under the microscope, it is quite easy for the physician to tell whether or not

it has been prepared for reception of the fertilized ovum. If this is true, he assumes *rightly that an ovum* was discharged for fertilization and that normal function of the corpus luteum resulted; in other words, he has proof that ovarian function is normal.

As a rule, the physician does not care to do the biopsy test prior to the tubal test. His reason for this is the remote possibility that any slight infection which might be introduced at the biopsy test be spread during the subsequent tubal test.

When the study of an endometrial biopsy specimen reveals irregularities of development which signify a non-occurrence of ovulation, the physician usually advises that the biopsy be repeated at the onset of the next bleeding. His purpose is the differentiation of a chance failure of ovulation from the repeated occurrence of failure of ovulation.

Occasionally the collection of 24-hour specimens of urine, as described under the husband's examination, may be deemed advisable, especially when studies of endometrial biopsies reveal evidences of deficient ovarian function. Painstaking and highly technical chemical and biologic studies of these urine specimens may afford data upon the gonadotropic function of the pituitary and upon corpus luteum (PREGNANEDIOL) and estrogenic functions of the ovaries. These data, accordingly, may complement those from endometrial biopsies.

When studies of endometrial biopsy specimens indicate that ovarian function is normal,—that is, ova are discharged and are available for fertilization, it becomes desirable to ascertain the time of ovulation. The reason for this is the belief that the ovum is fertilizable for only a limited time after ovulation. Knowing when ovulation occurs, coition may be had at this fruitful time.

A study of BASAL RECTAL TEMPERATURES may disclose the time of ovulation. The physician usually gives the wife these instructions. A rectal thermometer is secured. Each morning when she first awakens and *without any physical exertion*, the wife takes her rectal temperature. (The thermometer should have been "shaken down" the previous night and placed on the bedside table) A record of each morning's reading—from the end of one period to the onset of the next—is kept. (Readings after restless nights should be indicated.) The physician subsequently analyzes this record and may teach the wife to recognize her ovulation time. (See Chapter X.)

Basal rectal temperatures usually are subnormal prior to ovulation. At ovulation there is a drop to the lowest reading of the month Following ovulation, there is a sharp rise in daily temperatures, which become normal or slightly above normal and continue at this level until bleeding begins.

Chapter Six

The Hope of Success of Treatment

THE childless couple may ask rightfully how much can be done for it after the diagnosis is completed. What are the general chances for offspring? What degree of success attends the treatment of the more common causes of sterility?

After a couple has completed the various examinations, the physician can sift the data and add up the score. In conference with the couple he can report the damage found and evaluate its severity. He can estimate its repairability. Most couples desire a frank opinion on their chances for children. If the situation is hopeless, they will be told so as a rule. Nothing is less advised or less justified than holding out false hopes to a childless couple unless it be its victimization with prolonged, costly and useless treatments.

The chief advantage to childless couples of the inclusive studies which have been outlined is that, by a clear definition of existing causes for their sterility,

they are able to avoid empiric, *hit-or-miss therapeutic* endeavors. Any treatment, which results from these diagnostic data, has clear cut objectives. Its likelihood *of success is usually well known.*

In general, it has been estimated that from 25 to 50 per cent of childless couples by proper treatment may have children. These estimates are based on a critical definition of sterility. Higher figures as to salvage have been reported but usually not too much care was exerted in confining statistical inventories to couples whose sterile matings had lasted two years or more. In the Duke Clinic, the wives of 45 per cent of all couples, who were investigated thoroughly and treated *if it seemed advisable*, became pregnant. One or more healthy children were born to the majority of these couples; subsequent abortions, miscarriages and premature labors prevented a few of the couples from having offspring.

What are the more common causes of sterility and what is the likelihood of successful treatment of these?

Prior to any attempts at answering these questions, it should be observed that sterility may be absolute or relative. In other words, some conditions produce absolute sterility whereas others only tend to lower the fertility to a state of relative sterility. Often several coexisting conditions, which alone might produce little impairment in fertility, may result in grave low-

ering of fertility. Under these circumstances, it would be difficult to ascribe the sterile mating to any one of the conditions. It has become customary to talk of fertility-reducing or sterility factors rather than of causes of sterility. Estimates have attributed an average of two to five of these factors to each childless couple. Therefore, in the discussions to follow, when reference is made to a single cause of sterility, it should be understood that the gravest sterility factor present has been accepted as this cause in order to permit analysis and simplification of data.

The most commonly encountered sterility factor among the wives of childless couples is tubal obstruction. When this occurs its gravity justifies the diagnosis of sterility. In the Duke series, 50 per cent of the wives had obstructions in their tubal pathways. However, in the majority of these wives, the tubal obstruction was not of a serious nature and was corrected readily by the passage of the iodized oil at the first or second tubal test.

Fibrous scarring of the tubes from chronic infection produced serious tubal occlusion in 15 per cent of the wives. A good number of these severely occluded tubes may be opened by persistent medical treatment. Some physicians feel rather pessimistic about the chances of success under these circumstances, others report good results from persistent

and protracted treatments in 30 to 50 per cent of the cases.

The next most common fertility-reducing factor encountered in wives of childless couples is infection of the cervix, which results in hostility between the cervical secretions and the seminal fluid. This condition occurs in 10 to 20 per cent of the wives. It does not constitute an absolute cause of sterility. Proper treatment in practically all cases is successful in correcting the infection or circumventing it.

Decreased function of the thyroid, hypothyroidism, is another, fairly common, fertility-reducing factor diagnosed from the examinations of the wives. Its frequency of occurrence varies in different localities; in the so-called "goiter areas," it is much more prevalent. Generally it may be encountered in 5 to 10 per cent of wives It does not constitute necessarily an absolute cause of sterility except in those instances wherein it results in a failure of the ovaries to produce ova. Adequate treatment is practically always successful.

Spontaneous, not induced, ovarian failure of sufficient severity to interfere with the normal development and discharge of ova may occur in 5 per cent of wives. When this exists it produces absolute sterility. This grade of ovarian failure can be circumvented in perhaps 30 to 50 per cent of wives, who are still

within the reproductive span of life, if adequate treatment is given.

Errors of insemination, traceable to the wife, probably occur in 3 to 5 per cent of cases. These do not constitute absolute causes of sterility. Their fertility-reducing influences are circumvented easily.

Deficiencies in spermatogenesis occur fairly commonly in the husbands of childless couples. The majority of these instances of defective production of spermatozoa probably does not produce absolute sterility. In the Duke series 33 per cent of the husbands gave indications of deficient seminal values. In 25 per cent of the husbands these were regarded as operating only as a fertility-reducing factor. In 8 per cent of the husbands, however, the marked inadequacies of the seminal fluid led to the diagnosis of absolute sterility from this cause. Marked testicular atrophy existed in 3 per cent of the husbands. Treatment in the minor deficiencies of spermatogenesis is effective in perhaps 25 per cent of the cases in improving the character of the seminal fluid. In the more severe grades of seminal failure which are judged to produce absolute sterility, treatment is almost uniformly unsuccessful.

The incidence of deficient thyroid function is about the same in husbands as in wives. Its effect on fertility is similar. Its treatment is equally as effective.

Blockage of the tubular pathway of the sperma-

tozoa, which leads from the testes to the penis, by the end-results of infection probably occurs in 5 per cent of husbands. These pathways can be reëstablished by expert treatment, perhaps, in less than 20 per cent of cases.

Impairment of motility of the spermatozoa by infected secretions of the prostate and seminal vesicles probably results in 5 per cent of husbands. Treatment is usually effective.

Errors in insemination due to faulty delivery of the spermatozoa by the husband probably are significant in less than 5 per cent of cases. These can be circumvented in practically all instances.

Chapter Seven

Treatments Necessary for the Husband

WHAT treatments of the husband may be necessary as a result of the diagnostic data secured during his examinations? What may these treatments accomplish?

As has been observed, the abnormality most commonly encountered is that of inadequacy of the spermatozoa in motility, character and number. The degree of this inadequacy varies from minor deviations from normal to those representative of grave deficiencies.

The nature of treatments required in deficiencies of the spermatogenic function depends upon the inciting causes of these abnormalities.

When the testes have atrophied or have had their functional tissue reduced to fibrous and scar tissue by diseases, as mumps, tuberculosis, syphilis or tumors, little hope exists for any recovery of their functions.

When seminal inadequacy is related to insufficient

activity of the thyroid gland, it can be corrected by the oral use of pills of dried, powdered thyroid gland. Thyroid medication should not be used except at a physician's direction and under his supervision. Fresh powdered thyroid gland is an active substance and it is relatively easy to use too much of it. When a physician gives a prescription for it, he usually dispenses only a month's supply and most pharmacists will not refill the prescription unless upon authorization by the physician.

Some additional statements about thyroid medication are advisable. Powdered thyroid gland when taken by mouth acts slowly; it takes some 30 days for it to have full effect. Accordingly, both its good effects and its undesirable overdosage phenomena develop slowly. When too much thyroid is being taken, one becomes very nervous, loses weight despite ample food intake, the pulse is rapid, emotional instability develops and characteristic irritabilities exist. These symptoms disappear slowly when treatment is discontinued. Hyperthyroidism induced by overdosage with powdered thyroid is as harmful to testicular function as hypothyroidism. When thyroid medication is given, the function of the thyroid gland is not stimulated; simply its deficiency is supplemented.

Impaired spermatogenesis may be related to too frequent sexual activity. The amount of sexual activity which produces a drain upon seminal reserves

of one male may be quite in keeping with the sexual efficiency of another. The use of the term, excessive sexual activity, is, therefore, relative not to the number of coitions completed during a specified lapse of time, but to the fact that these impair the efficiency of spermatogenesis. Testes with low functional capacities require longer rest periods for recovery than those with high functional abilities.

A vicious circle of circumstances may develop which enhances the inefficiency of low reserve testes. A couple, whose husband has some impairment of spermatogenesis, finding itself unable to procreate, begins to increase the frequency of intercourse in the belief that, by so doing, the likelihood of pregnancy is increased. The fact may be that, quite to the contrary, the occurrence of a pregnancy is rendered less likely by the increased seminal failure of the husband. The physician usually is able to diagnose the existence of sexual drain by repeated seminal studies after varying periods of continence. When it exists, a regime of modified sexual rest, compatible with the functional capabilities of the testes, is usually effective in securing the best possible spermatogenic function.

Poor general hygiene may impair the seminal function of the testes. Excessive use of tobacco, chronic alcoholism, sedentary habits, chronic constipation and many other hygienic errors may impair spermato-

genesis. Striking individual variations exist in the harm produced by factors of this nature. The stresses and strains of modern living, as typified by the high-speed tempo followed by the average American city business man, commonly impair the efficiency of the seminal apparatus. The farmer, despite his economic wants and, perhaps, by virtue of his life of hard labor in the outdoors, gives much better results on seminal examinations than the tired, overstimulated city dweller. These considerations point to therapeutic approaches. These may be advised more readily by the physician than they are heeded and carried out by husbands.

Constitutional diseases and errors of nutrition impair the seminal function. Febrile attacks produce marked depressions in spermatogenesis; the effects may be sustained for months. These harmful effects of fever are due to the extreme sensitivity of the testes to moderately elevated temperatures This fact was established a number of years ago by a scientist who produced sterility in rams by simply encasing their testes in flannel bags. Testes, which are retained in the abdominal cavity or inguinal canals rather than descending into the scrotum in so-called CRYPTORCHIDISM, are impaired in the seminal function by the increased temperature of the body. Therapeutic measures which increase the level of health and nutrition enhance seminal efficiency.

Certain chemicals and drugs exert harmful effects upon the seminal apparatus. The list of these is long and, doubtlessly, far from complete. Recently it has been said that certain of the "sulfa" drugs, such as sulfanilamide, which are used widely in the treatment of severe infections, including gonorrhea, produce marked impairments in spermatogenesis. These effects are temporary, as a rule, and normal function returns following discontinuation of the drugs. If chronic intoxication or low-grade poisoning from contact with or ingestion of certain of these chemicals and drugs is corrected, improvements in seminal function may be anticipated.

The most common causes of impaired spermatogenesis have been discussed. Rarely is this due to inadequate stimulation of the testes by the pituitary and very rarely indeed has any improvement in seminal function followed treatment with GONADOTROPINS or GONADOTROPIC extracts made from the pituitary gland or from other sources. Some of the intensive advertising which is being done by certain manufacturers of these extracts indicate that spectacular results may be expected in practically all instances in which seminal inadequacies exist. These claims are utterly unfounded. Only in those few instances in which pituitary function is inadequate, may any results be expected from repeated hypodermic injections of these extracts.

The employment of the endocrine secretion of the

testes, testosterone, in the treatment of depressed spermatogenesis is not justified. Despite its striking ability to substitute for inadequate androgenic function of the testes, it cannot substitute for seminal deficiencies. Regardless of its ability to stimulate sexual drive, it does not enhance the fertility index. As a matter of fact, continued hypodermic administration of testosterone in full substitutional doses produces increasing damage to the seminal function; such a procedure has been reported as reducing the seminal values of normal men to practically zero.

When there is obstruction in the tubal pathway which prevents delivery of spermatozoa for fertilization, effective treatment may be possible in a relatively small number of patients.

If the site of this obstruction is the ejaculatory ducts which drain the ampullae and the seminal vesicles into the prostatic portion of the urethra, careful urethroscopic treatments by a urologist may reëstablish the patency of these ducts. These treatments include repeated passages of catheters up these ducts with dilatations and irrigations.

Prior to the institution of urethroscopic treatments, the urologist may attempt by repeated rectal treatments to facilitate better drainage when the obstruction is not absolute. These treatments include massage of the prostate and stripping of the seminal vesicles Shreddy pus and mucus, clogging these ducts, may be dislodged by these procedures. Some

of the "sulfa" drugs, as sulfanilamide, or penicillin, may be employed also for their effects upon the bacteria responsible for the infection.

Another form of treatment which the urologist uses in blockage is SCROTAL VASOTOMY. He punctures the vas deferens with the needle of an ordinary syringe and flushes out the vas deferens by injecting sterile salt water into it. Often the pus and mucus which cause the blockage may be washed out.

When the obstruction lies in the lower part of the epididymis, near the exit of the vas deferens, the urologist may advise an operation called EPIDIDYMO-VASOTOMY. In this operation an attempt is made to short circuit the spermatozoa around the obstruction by connecting the vas deferens with the epididymis above the site of the obstruction.

When the husband's seminal fluid is hostile to the spermatozoa due to infection in its prostatic and seminal constituents, urologic treatments involving the use of "sulfa" drugs, prostatic massage and seminal stripping may be of value.

If errors in the delivery of the spermatozoa exist, these may be circumvented by changes in posture at the time of intercourse, by favoring secondary vaginal insemination through the use of precoitional soda douches, or by the physician's injection with a syringe of some of the husband's seminal fluid directly into the wife's cervix.

Chapter Eight

Treatments Necessary for the Wife

WHAT treatments of the wife may be necessary? What purposes do these treatments seek to accomplish?

When tubal blockage occurs, it should not be regarded as an absolute, irremediable cause of sterility. A quite hopeless situation does exist when infected tubes have been removed surgically. It is true, however, that, even under these circumstances, the miraculous may happen: the stumps on the uterine walls left behind after surgical removal of tubes may open years after operation and a pregnancy may occur. This gratuitous happening is to be regarded as a rare blessing of a kind and provident Nature rather than an encouraging hope to be extended to women surgically sterilized. These facts mean that surgical removal of tubes should be avoided if possible.

Much may be done in the way of conservative treatment of tubal infections. The results obtained are

rarely spectacular. Often the treatment may seem to be getting no results. Ennui and recurring abdominal discomforts may cause the patient to become impatient and to demand surgical measures. Let the patient realize, however, that the fact that the tubes remain *in situ* constitutes a positive accomplishment, when the patient's child-bearing function is considered. *There is always a possibility of re-establishing tubal pathways as long as the tubes remain in the pelvis; there is no hope of replacing tubes which have been removed.* More emphasis upon conservative treatment of tubal infections and de-emphasis of pelvic operations in general will prevent much hopeless sterility among women.

Heroic surgery designed to circumvent the absolute sterility of women deprived of their tubes rarely does more than add the insult of another major operation. These operations usually attempt the transplantation of an ovary within the uterine cavity in the hope that ova discharged by the ovary in this new location may be fertilized. As a rule, the ovary fares poorly in this foreign terrain and does not carry on its normal functions. If a pregnancy does occur, abortion or rupture of the uterus may follow. Eventually, a second operation is requred to remove the uterus because of pain or degenerative changes in the transplanted ovary.

The majority of blocked tubes may be opened if

the wife and physician are persevering and are not too readily discouraged by initial failures. The most effective therapeutic agent for this purpose is repeated attempts to pass iodized oil through the tubes, in other words, repeated tubal tests. The oil has an antiseptic and softening effect upon the obstruction. The moderate pressure exerted upon the oil during injection ultimately may force an opening.

Many tubes are obstructed by plugs of dried mucus or by a catarrhal inflammation which glue together the walls of the tubes. Often the first tubal test removes these obstructions The majority of these requires no more than two injections of iodized oil. These tests are not done more frequently than once monthly.

When grave obstruction occurs from scarring and distortion of tubes by chronic infections, repeated injections of iodized oil are necessary. Reëstablishment of the patency of tubes has been accomplished by this method when as many as 10 to 15 previous treatments had been unsuccessful.

Often pregnancies occur the same menstrual month that tubal obstructions are overcome. Occasionally, obstruction of tubes is diagnosed in retrospect upon the basis of a wife becoming pregnant promptly following a tubal test, which gave no evidence that any obstruction had existed.

Surgery plays a minor and unimportant rôle in

reëstablishing the patency of blocked tubes. A number of operations has been described for preparing artificial openings in tubes. These operations are referred to as STOMATOPLASTIES. Successes from them are very rare.

When infection of the cervix is encountered, treatment is desirable because of the likelihood of hostile effects of this infection upon the seminal fluid. Cleansing warm douches and local applications to the cervix aid in clearing up this infection. If these are not completely efficacious, cauterization of the cervix is advisable. Cautery of the infected areas is done with an electrically heated needle. This causes the unhealthy tissue to slough and permits healthy tissue to reform.

When the cause of cervical hostility is poor drainage of the cervical secretions because of a tight external os, all the treatment that may be required is slight office dilatations of the cervix at the middle of the menstrual months for several months.

When depressed basal metabolic rates indicate hypothyroidism, even though there are no evidences of ovarian failure, treatment with pills of dried, powdered thyroid gland usually will be advised. The general discussion of thyroid therapy of the husband applies to the wife.

It is believed that inadequate thyroid function impairs the development of the ovum. Even if the ovum is discharged by the ovary under these conditions, it

may not be fertilizable or may give rise to an abnormal pregnancy which is aborted. Adequate thyroid therapy, therefore, may enhance ovarian function and prevent abortions.

The existence of ovarian failure, which is characterized by the non-occurrence of ovulation, results in grave sterility. The nature of the treatments required is dependent upon the cause of the failure.

If this failure is due to senescence of the ovaries, there is no effective therapeutic approach. There is no way to rejuvenate the ovaries of the woman who has waited until middle age to get married or to attempt to have a family. In some women the sequence of events which leads to the change of life may begin even before the fortieth year. This may produce premature ovarian failure, which is irreversible therapeutically.

When ovarian failure follows roentgenologic treatments to the pelvic organs, little hope of success attends any therapy. Most physicians realize these undesired effects of roentgenologic therapy and do not employ this type of treatment in young women who still have maternal aspirations. Previously many young women were given this type of treatment for dysmenorrhea and irregularities of uterine flowing. The subsequent sad results on fertility which followed have led to its infrequent employment [illegible] ent. Some physicians [illegible]

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The existence of ovarian failure, which is characterized by the non-occurrence of ovulation, results in grave sterility. The nature of the treatments required is dependent upon the cause of the failure.

If this failure is due to senescence of the ovaries, there is no effective therapeutic approach. There is no way to rejuvenate the ovaries of the woman who has waited until middle age to get married or to attempt to have a family. In some women the sequence of events which leads to the change of life may begin even before the fortieth year. This may produce premature ovarian failure, which is irreversible therapeutically.

When ovarian failure follows roentgenologic treatments to the pelvic organs, little hope of success attends any therapy. Most physicians realize these undesired effects of roentgenologic therapy and do not employ this type of treatment in young women who still have maternal aspirations. Previously many young women were given this type of treatment for dysmenorrhea and irregularities of uterine flowing. The subsequent sad results on fertility which followed have led to its infrequent employment at present. Some physicians subscribe to the theory that very

small doses of roentgenologic therapy to ovaries may stimulate them. Most physicians brand this treatment as a slow form of castration.

When ovarian impairments are due to the local effects of pelvic infection, adequate conservative treatment of this infection enhances the level of ovarian function.

Impairment of general health due to chronic diseases or undernutrition often produces ovarian failure. Correction of these factors is followed by improvement in the functions of the ovaries. Generally speaking, vitamins play an insignificant rôle in the treatment of sterility. Most patients find it cheaper, more practical and more palatable to eat a well-balanced diet than to purchase their nutritional requirements from drug stores.

Excessive caloric intake with resultant obesity is as harmful, perhaps, to ovarian function as undernutrition. An effective part of the treatment of ovarian failure in the obese wife is the reduction of her weight to normal levels by caloric dieting.

When ovarian failure is due to inadequate stimulation by the pituitary gland, the hypodermic use of gonad-stimulating or gonadotropic extracts may be successful in restoring sufficient ovarian function for conception. The most effective gonadotropic extract for this purpose is one prepared from the serum of pregnant mares. This form of treatment is not a

panacea for all ovarian failure. As a matter of fact, it is effective only in those instances in which deficient pituitary function is the cause of ovarian failure.

Since, as it has been observed previously, the physician cannot diagnose the level of pituitary function with exactness in most instances, he may advise a trial of this gonadotropic therapy if and when the other causes of ovarian failure have been ruled out. This is justified. When he makes this decision, he will be prepared to follow the course of these treatments with careful tests, such as endometrial biopsies and daily basal rectal temperatures, in order that he may judge whether responses are being secured. He should not depend only upon the occurrence or non-occurrence of pregnancy as the only index of the effectiveness of his treatments. The proper use of gonadotropic therapy requires painstaking adherence to strict routines of observations, dosages and cyclicity of administration. If treatments are not carried out by one thoroughly familiar with these, little good may be accomplished and even harmful effects may be produced.

If and when pregnancies follow gonadotropic therapy, it generally is considered wise to initiate promptly active prophylaxis against abortions. Recurrent ovarian failure during the early weeks of these pregnancies is not uncommon and results in loss of the pregnancy unless precautionary measures

have been instituted. These measures will be discussed a little later.

Regardless of how effectively the physician may be able to treat the endocrine deficiencies of the ovaries with preparations of the active ovarian principles, estrogens and progestin, these play no significant part in the treatment of sterility. Despite the fact that the use of these therapeutic agents may regulate irregular bleeding or induce bleeding when it has been absent for years, no justification exists for the assumption that ovarian function has been improved or that sterility has been overcome. This form of treatment is effective because it supplies deficiencies in the endocrine function of the ovaries; in other words, it substitutes for the endocrine work the ovaries should do. There is no way to substitute for the ova which these ovaries do not form. The only alternative is to try to improve the ovarian function to such a state that the ovaries are capable of forming and discharging these ova.

When inseminational errors on the wife's part exist, these can be circumvented usually by changes in posture at the time of intercourse, by favoring vaginal insemination through the precoital use of soda douches or by the physician's injection with a syringe some of the husband's seminal fluid into the cervix.

Many women, although not sterile in the true sense of the term, remain childless because of their inability to carry a pregnancy to full term. These women are

described as having "irritable uteri." Frequently their pregnancies terminate by abortion during the first 2 to 4 months of gestation. Since in most instances, no organic causes are found for these recurring abortions, their causation is referred commonly to thyroid or ovarian deficiencies.

When hypothyroidism exists, thyroid therapy is given routinely during pregnancy. This is effective in preventing abortions.

When the thyroid function is judged to be normal, it is assumed generally that these recurrent abortions are due to deficient corpus luteum activity of the ovaries. It is believed that a similar type of ovarian deficiency is apt to occur in women who have become pregnant following effective gonadotropic therapy. The success, which follows rational therapy founded upon these assumptions, seems to substantiate the validity of this theory. There is a general confidence that many children are being born now to women who previously lost their pregnancies by abortions. A well-ordered anti-abortion regime should be tried in women with histories of recurring abortions and in women becoming pregnant after gonadotropic therapy.

The wife should not wait until she is well advanced in another pregnancy or until an abortion is impending to start her anti-abortion regime. Prior to attempting another pregnancy, an adequate diagnostic survey should be done. If hypothyroidism exists, thyroid

therapy should be started well in advance of the beginning of pregnancy and should be continued throughout its duration.

As soon as pregnancy is suspected, the physician should be consulted for advice, if this has not been given previously. The early institution of treatment enhances the likelihood of success. Many physicians promptly start oral therapy with estrogens, which is continued until the latter part of pregnancy. Others may give, in addition, oral or injected progestin. To gage the efficiency of his dosages and for prognostication, the physician may request urine specimens for pregnanediol studies.

Hygienic instructions usually are given which include the following. Intercourse should be discontinued for the remainder of pregnancy. Any strenuous exercise, lifting or climbing of steps should be avoided. The automobile should not be driven, or the sewing machine used if it is of the pedal type. An afternoon siesta is desirable. Strong cathartics are to be avoided. It is suggested frequently that the patient remain in bed at those times when she is missing periods. She is told to go to bed promptly and to notify the physician if there are any signs of threatening abortion.

It is stated generally that this regime is effective in securing living children for over 50 per cent of women who previously had had recurrent abortions.

Chapter Nine

Some Popular Misconceptions

POPULAR concepts of medicine are replete with misconceptions, fanciful theories, silly superstitions and granny tales. The unscientific lore concerning reproduction and its pathology is voluminous Any discussion of sterility, which attempted to review these, would degenerate into a documentation of the peculiarities and fantasies of sexual customs and behaviors. It would not be wise, however, to terminate this discussion without calling attention to some of the present-day misconceptions of sterility.

The saddest of these is belief by a small minority that sterility, like the Biblical curse of barrenness, is visited upon couples with a finality which permits no therapeutic recourses. Likewise a few couples express the belief that nothing "artificial" should be done to aid conception, the assumption being that Nature must have some good reason for denying the procreative function These defeatist resignations are

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who may believe that little or nothing may be done for sterility, are the patients and physicians who are ready to try each and every fad or unestablished remedy which may illuminate the therapeutic horizon. Under these circumstances childless couples readily become willing guinea pigs for the evaluation of each hopeful panacea born in the scientific laboratories. Time and time again the public's fancy is aroused and its enthusiasm kindled by news stories of the lay press, which often are occasioned by flagrant distortions and gross exaggerations of reports given by laboratory scientists and physicians at meetings of their scientific and medical associations. The physician, who is so busy with the practice of medicine that he cannot go to medical meetings and does not find time to read the various medical journals, not infrequently is victimized by smooth-talking and none-too-sincere drug salesmen, who describe in glowing terms the virtues of their wares.

One of the most widely exploited of the recent remedies for sterility has been the gonadotropic extract prepared from the serum of pregnant mares. Wide and flagrant publicity given to this substance by the newspapers and magazines and high-pressure direct solicitations of physicians in its behalf has led to its widespread and usually uncritical use. Wives and husbands alike, if they have read some of the glowing stories of its accomplishments or have had

encountered infrequently in modern medical practice.

There are couples who do believe sincerely that there is little need of consulting physicians because of their childlessness. These do not know that something can be done for them. This little book has failed in its purpose if it has not shown good reasons for hope on the part of these couples.

Woefully ignorant and gullible, on the other hand, is the wife who believes that her physician by a single vaginal examination can find the cause of the childlessness of her mating and that from this diagnostic effort alone final judgment can be passed upon the couple's fertility. Equally ignorant and gullible is the husband who believes that the fact a physician looked at a drop of his seminal fluid under a microscope and reported that his spermatozoa were alive constitutes unimpeachable evidence that his fertility is unimpaired. Likewise often fallacious is the acceptance of the husband's fertility as being proven upon the grounds that some years previously he fathered a child; this rationalization ignores the possible occurrence of intercurrent diseases or injuries which may impair spermatogenesis. When physicians believe, if they ever do, that these diagnostic attempts constitute the rendering of an adequate medical service to their patients, they have not kept up with the progress made in the field of reproduction in the past twenty years.

In striking contrast to the patients and physicians

who may believe that little or nothing may be done for sterility, are the patients and physicians who are ready to try each and every fad or unestablished remedy which may illuminate the therapeutic horizon. Under these circumstances childless couples readily become willing guinea pigs for the evaluation of each hopeful panacea born in the scientific laboratories. Time and time again the public's fancy is aroused and its enthusiasm kindled by news stories of the lay press, which often are occasioned by flagrant distortions and gross exaggerations of reports given by laboratory scientists and physicians at meetings of their scientific and medical associations. The physician, who is so busy with the practice of medicine that he cannot go to medical meetings and does not find time to read the various medical journals, not infrequently is victimized by smooth-talking and none-too-sincere drug salesmen, who describe in glowing terms the virtues of their wares.

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them passed on to them by their friends, may be persuaded that it is the long awaited panacea for the childless. They may be told, and it has even been reported in medical journals, that a single injection may produce conception. The enthusiasm for this product was not to be confined: "mare serum" was not only to be used in male or female sterility but to hurry up pregnancy in those whose fertility was not impaired but whose patience was scanty. Indeed, it was suggested that treatment with "mare serum" might permit women to avoid the ennui of having *their babies one by one and instead to have them in pairs or in triads.* Time and time again the gossip over the bridge table had it that Mrs. X, who was highly desirous of children, had been going to Dr. Y for a month or so and had not been given "mare serum." Heads were wagged and it was agreed that Dr. Y was not an up-to-date physician.

This popular enthusiasm could not help victimizing physicians. Many physicians were led to give the *treatment a trial although they had not established* the existence of any ovarian failure in their patients. Occasionally, perhaps, the most ardent supporters of this type of therapy had disappointment and chagrin visited upon them. There is the record of two women being treated intensively and over long periods of time with "mare serum" despite the fact that no examinations had been made of them or their hus-

bands. Changing physicians, because no results were obtained, these women were surprised to find out from subsequent examinations that the treatments had been misdirected: neither of the husbands had any spermatozoa in their seminal fluids.

This fad is now waning for two important reasons: results were not obtained and physicians by a number of conservative medical reports have been convinced that "mare serum" has a very limited place in the treatment of male and female sterility. This place has been delineated in previous discussions

Another gonadotropin, one prepared from the urine of pregnant women, enjoyed a moderate popularity of similar nature some five to ten years ago It never reached the crescendo of the "mare serum" fantasy. It now has been relegated to a small niche in the therapeutic armamentarium of sterility.

The shortcomings of extracts of the female secretions, estrogens and progestin, and of those of the male secretions, androgens, in the treatment of ovarian and testicular sterility already have been pointed out.

The vitamin hobby has been ridden vigorously by the lay public as well as by some members of the medical profession. Practically every field in medicine has its ardent supporters of vitamin therapy. The reproductive field has not been spared. Many barrels of wheat germ oil have been consumed by childless

couples in the hope that the contained vitamin E might favor conception. No clear-cut medical evidence has been submitted that a *single child* owes its generation to wheat germ oil. This fad, however, has furnished millers with a lucrative outlet for one of their by-products.

Perhaps, the least comprehended of the present day granny tales is that of the "test-tube" baby. The term, "test-tube" baby, is a non-committal popular expression for babies born following the injection of *seminal fluid of a man, other than the husband, into* the cervix of the wife. A clear definition of the procedure rapidly dispels many of the popular misconceptions.

How does this technic differ from adultery? The Supreme Court of Ontario did not think it differed at all. Some 40 years ago it sustained charges of adultery against a wife who had attempted to have a "test-tube" baby in this language: "The essence of the offense of adultery consists not in the moral turpitude of the act of sexual intercourse but in the voluntary surrender to another person of the reproductive powers or faculties of the guilty person." Legal opinions in the United States have been varied but apparently there has been no statutory action. Religious leaders generally object.

The generally expressed legal opinions in this country, however, agree that the "test-tube" baby which

results from such a scientific liaison is illegitimate and it is advised that it be adopted formally to insure its and the parents' legal security. Likewise legal opinions have warned against possible blackmail of the couple by unscrupulous donors employed for the insemination.

These unsavory moral elements and the existence of many possible legal and ethical quagmires, when brought to the attention of a couple, are sufficiently cogent to discourage it from any further consideration of the project.

Were the objections not enough, the expensiveness and the inconvenience of the method discourage both the physician and patient. Barring from consideration the previously mentioned objections, the technic of artificial insemination with a donor's seminal fluid, would be indicated only in those instances in which the husband was hopelessly sterile and the wife of normal fertility. These must have been proven by careful diagnostic surveys. The physician then is charged with the responsibility of securing a donor who is highly fertile, who is readily available and who has no moral scruples of his own. Moreover, the physician should be sure that the donor is free from disease or hereditary taints and that he does not differ sufficiently racially or constitutionally from the couple to cause subsequently striking lack of resemblance of the offspring to the couple. Accord-

ingly, careful examinations of the donor are necessary.

Finally, not one insemination must be done but repeated ones two or three times monthly until pregnancy occurs. The donor and physician must be paid each time for their services in addition to the expenses of the preliminary examinations.

Therefore, it is not hard to understand why most couples, who find themselves hopelessly sterile, prefer to adopt children. In the adoption proceedings the physician may be of valuable assistance. His counsel should be sought. Most states have adoption agencies and, if possible, adoption should be done through them. The physician will be available for assuring the couple of the health and hereditary background of the child of its choice. Legal counsel is desirable also, lest some loophole may exist in the legality of the adoption which may crop up to tear the heart strings of the couple when it has grown to love its foster child.

Chapter Ten

Some Practical Suggestions

HERE are some practical suggestions for more effective cooperation of the couple with the physician. If these suggestions are followed, the physician can give more efficient service.

A physician in the home-town or nearby should be chosen. This will minimize the inconvenience of repeated examinations and of treatments. More can be done for the childless couple by a physician of the locality than by some distant specialist unless his particular skill be required.

Physicians commonly have many duties to many patients other than childless couples. Some of the other patients may require emergency visits. The childless couple, however, should refrain from making its problem an emergency and should avoid impatience or asking for special times of appointments. There are many physicians who do not accept the investigation of infertility because they consider childless couples to be too demanding and to consume too much of their time.

The couple should be diligent to make appointments and even more diligent to keep them. An investigation should not be started unless there is willingness and time to adhere to the physician's schedule. Professional business should be transacted during the physician's office hours and unnecessary telephone calls and telegrams and requests for appointments on Saturdays and Sundays should be avoided.

A full and truthful account of past history should be given to the physician. Withholding information from him causes no one harm save the patient. If there have been previous operations, the physician should be supplied with definite dates and information, including a statement from the surgeon. If there have been recent or past treatments, the physician should have specific information regarding these, even if copies of prescriptions must be obtained from former physicians.

When a physician is chosen with care, full cooperation should be given him and full confidence placed in him When a physician does not follow exactly some of the methods described in this book, he should not be confronted with this fact. There are many ways in which childless couples may be investigated and treated. *This book seeks to orient the couple, not to formulate a method of diagnosis or treatment for physicians.*

The couple should be prepared to receive frank

expressions of opinion from the physician when its studies are completed. Facts should be desired, not sugar-coated pills. A physician should not be opportuned to treat, when no treatment is deemed necessary or no treatment is thought likely to help. All childless couples cannot have children. These couples should not criticize or blame their physicians.

The couple should remain under one physician's care until he has a full chance to investigate and treat. Too many childless couples pass from physician to physician, having the same examination and often receiving similar opinions, but always hoping for some new recommendation.

The wife can be of considerable help to the physician if she keeps careful menstrual records. Information should be specific as to dates and should be available month after month to the physician.

It is very helpful if the wife keeps preliminary basal temperature records for two or three months before she consults a physician These may provide the physician with proof that ovarian function is normal or abnormal and, in the event that ovarian function is normal, with proof that intercourse has occurred at the time of ovulation,—that is, when pregnancy should have occurred. For these reasons, we shall discuss the matter of keeping basal temperature records.

Knowledge that ovulation, or discharge of the egg

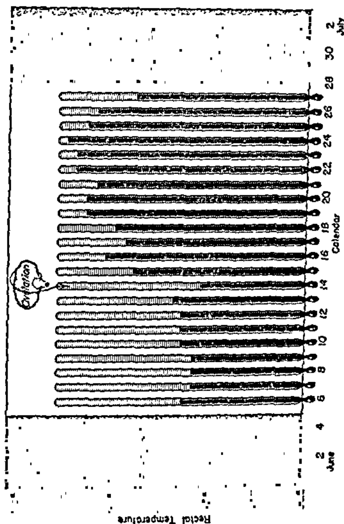


FIGURE 11. Basal rectal temperatures during a fertile or ovulatory cycle.

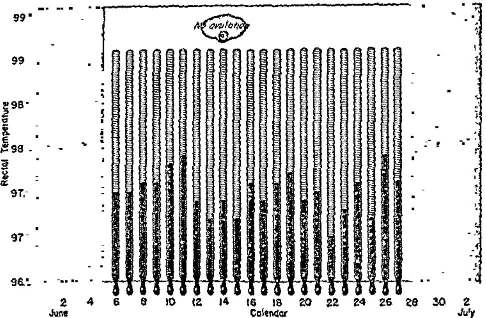


FIGURE 12. Basal rectal temperatures during a sterile or anovulatory cycle.

from the ovary, does occur and knowledge of when it occurs are very important. The time when ovulation occurs or whether it occurs at all (See Figures 11 and 12) may be judged from carefully kept records of daily rectal temperatures, thereby permitting timing of intercourse with optimal fertility.

Although it is doubtlessly true that the majority of healthy women ovulates approximately fourteen days before the onset of menstruation, this generalization is not necessarily true for each woman. When the menstrual cycle is quite irregular, estimation of the time of ovulation may be impossible on the basis of when the next period is due. Under these conditions basal temperature records may prove very valuable.

Although normal temperature is stated as 98.6 degrees, slight variations from this value do occur. Accordingly, readings of rectal temperatures should be made accurately to the nearest tenth of a degree. Rectal temperatures are normally lower after menstruation and higher before menstruation. There is a shift from lower to higher values at the time of ovulation. Ovulation is thought to have occurred when there has been a rise of 0.4 to 0.6 degree or more between twenty-four-hour readings. The time of ovulation is thought to be the day before this rise occurs.

The following instructions should be followed carefully:

(1) Employ only a well lubricated rectal thermometer with Fahrenheit scale. Learn to read the thermometer accurately.

(2) Shake the thermometer down the night before! Place it on the bedside table.

(3) At the first waking moment, before stirring from bed and before drinking, smoking, or eating, take the rectal temperature for five minutes by the clock. Record this reading, together with the correct date, on one of the basal temperature charts (See Figure 13). Plot the reading on the chart as a black ink dot.

(4) Transform this dot into an asterisk when the previous night's rest was fitful, less than eight hours, or when fever, cold, or other causes exist for alteration in temperatures. Explain by notation on the chart any abnormality which may have vitiated the temperature reading.

(5) Indicate the time of intercourse by an arrow pointing to the appropriate day on the temperature chart.

(6) Indicate by the word "ovulation" when it was thought that ovulation occurred. This will establish whether or not the interpretation of the temperature curve was correct.

(7) Chart the days of menstrual flowing as indicated on the sample chart. Plot both the periods occurring before and after the temperature chart.

(8) Take rectal temperatures from the end of one period to the beginning of the next.

(9) Make the record as complete and as accurate as possible and have it available for the physician's inspection at each visit.

A number of perforated temperature charts is supplied with this book. These may be used by the wife. Three or four consecutive temperature records may be kept and carried to the physician on the first visit.

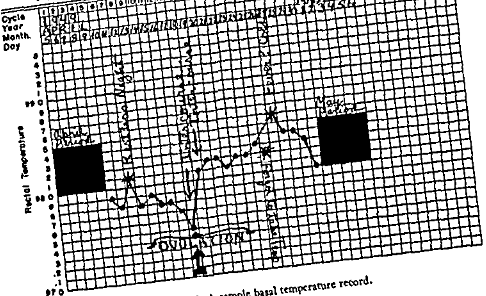


FIGURE 13. A sample basal temperature record.

Chapter Eleven

Some New Facts and Fads

THE cervix, or the mouth of the womb, is more than a passive channel connecting the vagina and the body of the uterus. Its lining secretes a very important mucus. In order for fertilization of the female egg to occur, spermatozoa must have the permission and cooperation of the cervical mucus. Cyclic changes in the mucus condition its congeniality and permeability to spermatozoa.

From the end of a menstrual period until a few days prior to ovulation, the mucus forms a viscid, tenacious and spermatozoal-tight plug. Just prior to the time of the discharge of the egg from the ovary, the cervical mucus becomes clear, watery, and no longer a barrier to the ingress of spermatozoa. This preparation of the mucus for the entry of spermatozoa has been related to increasing blood levels of estrogen. A few days after ovulation the mucus again becomes viscid and tenacious and again it acts as an effective spermatozoal plug until it is shed at the onset of menstruation. This second stage

of viscidity has been related to the action of hormones secreted by the postovulational corpus luteum.

Accordingly, when the physician does a postcoition test, he seeks to find out whether or not the cervical mucus is being properly prepared for insemination Therefore, he will schedule this test at the time when ovulation is imminent and he will ask the patient to supply basal body temperature records during the menstrual cycle in which the test is done, so that there will be a record of when ovulation did occur. His observations during this test will indicate whether or not the mucus was watery and was characterized by an adequate SPINNBARKEIT (as the Germans call it), the ability to be drawn into long threads. He will be concerned with whether or not spermatozoa have found their way into this watery mucus, if they are living, and if they appear to be traversing it.

There is considerable evidence that the cervical mucus plays another important role. It acts as a selective filter, permitting only morphologically normal spermatozoa to proceed toward the female egg.

Whether or not the mucus has a role in the energization of spermatozoa is a moot question It may supply chemicals which invigorate or facilitate spermatozoal migration.

Much has been written in recent years about the "FERNING" or "ARBORIZATION" of cervical mucus.

Some wit coined the phrase "the cervix says it with flowers." We explain this. When cervical mucus is spread thinly on a glass microscopic slide, allowed to dry, and then is examined by low magnification, it may be found to have crystallized into patterns that look like the palmate or pinnate fronds of ferns. One's imagination may see a resemblance to maidenhair fern (*Adiantum*) or to maidenhair spleenwort (*Asplenium trichomanes*) or to some others of the numerous ferns. What does a positive FERN TEST mean? It simply means that there were present in the cervical mucus various salts in proper concentration for crystallization. However, this ordinarily occurs at the acme of estrogen secretion and before the corpus luteum secretes its progestational hormone. Therefore, physicians may do this simple test as a rough index of the cyclic peaking or production of estrogen. It is not a reliable test for ovulation. Furthermore, most mucous secretions will fern at times, nasal and salivary mucus as well as prostatic fluid of the male.

Some recent studies have suggested that the cervical mucus may participate in the immunological mechanism of the body. Normal females may have cervical mucus which is adequately prepared *circa* ovulation time but which inactivates the spermatozoa of their mates. This would prevent conception in healthy and otherwise normal couples. Such oc-

currences have been related to a serious incompatibility in blood types of the partners of couples. The physician, accordingly, may investigate blood types of the couple. However, marriages are not governed by blood types!

Attempts have been made to reckon the time of ovulation by the identification of glucose in the canal of the cervix, so-called cervical glucose. Sticks, with a glucose-enzyme and indicator impregnated in their cotton tips, have been inserted into the cervix and the color reaction observed. Also urine sugar analysis paper has been applied to the upper vagina; the reaction is the same which the diabetic uses to test his urine. Some workers have been very enthusiastic about their ability to identify the time of ovulation by this method. Others have found that there is glucose in the cervical canal and in the upper vagina at all phases of the cycle and that no specific correlations were possible between its presence and ovulation-time, as judged by basal body temperature records or by studies of endometrial specimens. If this were a good method, one would doubt that many women or physicians would cooperate mutually in a daily-stick-in-cervix office routine for long!

Incompetence or dilatation of the internal opening of the cervix into the body of the uterus is not a cause of inability to get pregnant but may cause

early abortions which deprive a couple of children. The physician may diagnose this condition by the use of a balloon attached to the tubal test apparatus. When inserted into the uterus and filled with radiopaque materials, an excellent outline of the uterine cavity and cervical canal may be secured. Treatment may be done subsequently before a pregnancy but usually during the very early months of pregnancy; it essentially embraces placing a purse-string-like series of stitches about the upper opening of the cervix.

So much for the cervix, its physiology, and pathology. Now we move on to consider the body of the uterus.

The uterus, or womb, is not only the place of residence of the developing embryo, but also has an active role in conception. When the physician does the so-called tubal test, he also makes important observations upon the condition of the uterine cavity. He cannot make these observations if he uses the gas method for testing tubal patency. When he uses radiopaque liquids, he can outline the uterine cavity (HYSTEROGRAPHY) and secure an X-ray picture (HYSTEROGRAM) which indicates whether or not the cavity is normal. Fibroid tumors (FIBROMYOMAS) may distort the uterine cavity and damage locally the lining of the uterus. If implantation is attempted near one of these tumors, it may *fail* or be

so incomplete as to abort early, due to poor blood supply. Other errors in the uterine cavity may result from bands of tissue which partially or completely divide the uterus; these are called SEPTA. Sometimes there may be two rudimentary horns, instead of one normal uterus.

Normally the lining of the uterus is properly prepared by the hormones of the ovaries so that, after ovulation, it is ideally prepared for entry and implantation of the fertilized egg. This preparation entails the development of adequate blood vessels to supply sufficient nutrition to the early embryo At times, despite normal function of the ovaries, the lining or endometrium is not normal because of infection or endometritis. Tuberculous endometritis is not very common in our country but is quite common in other countries of the world, as Israeli, Chile, and Scotland. If this endometritis is quite extensive, it is usually diagnosed when the physician does an endometrial biopsy. Implantation of a fertilized egg cannot occur when there is severe endometritis.

In addition to disease of the endometrium, there may be local or fairly generalized replacement of it by fibrous or scar tissue The term "SYNECHIAE" has been applied to the scars. Recently there has been an increasing tendency to relate this scarring to vigorous curettage or scraping of the womb, par-

ticularly after abortions. Sometimes this may be due to the use of caustic solutions inside the uterus after curettage. When a curettage is done, it should be lightly done. There is no real relationship between the large amount of tissue which is removed by curettage and the very small amount of tissue which is spontaneously discharged from the womb at the time of menstruation. These uterine scars not only prevent nidation at their sites, but indicate even more extensive impairment of the blood supply to the endometrium. These scars may be diagnosed by hysterography. Parts of, or almost all of, the uterine cavity may be obliterated. Infections and scarring of the endometrium may result in disturbance of uterine flowing: too much bleeding, too little bleeding, or even absence of bleeding.

The uterine muscle fibers which comprise the MYOMETRIUM also have an important role in producing proper contractions. These contractions may be impaired by fibroid tumors or by endometrial disease which has invaded the myometrium. It is known that contractions which begin near the cervix and proceed upward towards the uterine opening of the tubes are important in orienting and propelling the spermatozoa during their uterine travels. It is thought that these contractions result from the sudden release of OXYTOCIN from the posterior part of the pituitary gland during woman's orgasm.

(Oxytocin is a hormone which causes contraction of uterine muscle.) That this mechanism is not absolutely necessary for the upward progress of spermatozoa is indicated by the fact that some women do get pregnant who have never had an orgasm The physician's ability to measure the normalness of function of the myometrium is quite limited. Perhaps, instruments now being perfected which permit recordings of contractions of the uterus by electrical methods (ELECTROHYSTEROGRAPHY) may implement future studies.

The tubes, as we have observed for the cervical canal and uterus, are not simple channels. They have a normal physiology, which is important.

It has become increasingly more evident that the FIMBRIAE or fingers at the ends of the tubes near the ovaries are actively concerned with the pickup of the ovum or egg at the time of ovulation. These fingers appear attracted to the site of imminent ovulation, surround it, and, acting as a suction pad, form a direct connection between the site of ovulation and the tubular channel. Accordingly, if tubes are diseased, even if their openings near the ovary are unimpaired, their fingers may not function in picking up the discharged egg. Physicians lack a specific test for the occurrence or nonoccurrence of this pickup. It may be surmised that tubes cannot pick up the egg if there is evidence from other

findings that tubal disease or damage has occurred.

When the physician does a tubal test, his information deals essentially with whether or not the tubular channel is open or blocked. When he uses the gas method, he only knows that one tube is patent or that both tubes are blocked. When he uses the method of HYSTEROSALPINGOGRAPHY, he can ascertain not only the bilaterality of patency, but also the specific location of any blockages. The radiopaque material for hysterosalpingography may be in aqueous or oil solution. There are advantages and disadvantages for both media.

The physician would like to know more than the fact that a tube is patent. He would like to know whether or not there is normal action of the mechanisms which propel the egg, once it is picked up by the tube, towards the uterus. He has no specific test for this. Tubes are lined by cells which have hair-like bristles (CILIA) which swish in the direction of the womb. Also there are waves of tubal contractions toward the uterus. These are mechanisms to propel the egg. Accordingly, tubes may have lost their CILIARY LINING from disease and may have lost their MUSCULAR PERISTALSIS from the same cause, and yet are not blocked or obstructed. These tubes, even if an egg gets into their channels, *cannot propel this egg towards the womb* If such an egg becomes fertilized, it may grow in the tube

as a TUBAL PREGNANCY, which is a serious condition. So the tubal test, as valuable as it is, does not tell the whole story about the normalness of the tubes. Some of the methods employed for tubal tests afford recordings of contraction waves. These waves have been related by some to contractions of the tubes and by others to contractions of the uterus. Thus, there is disagreement. If definite tubal contractions could be identified, we would be one step further toward verifying normal tubal physiology.

There is an increasing concern regarding the harmful effects of the irradiation of woman's pelvis, particularly her ovaries, during diagnostic roentgenographic studies. Therefore, the physician will keep at a minimum fluoroscopic examinations and roentgenograms during hysterosalpingography.

The common use of ANTIBIOTICS, specifically of penicillin, has done much to curtail the damage and scarring from salpingitis or infection of the tubes. This is particularly true when the salpingitis is due to gonorrheal infection. Early treatment of this with penicillin usually prevents tubal impairment and consequential tubal sterility.

New knowledge accumulates about ovarian physiology, but much remains to be learned. The secretion of ovarian hormones and the development of and discharge of ova are under the control of gonadotropins elaborated by the pituitary gland. The func-

tion of the pituitary in this regard, however, is controlled by centers in the HYPOTHALAMIC REGION of the brain.

The data secured by basal body temperatures continue to be of most practical value in estimating the time of ovulation and thereby identification of the fertile epoch of the month. In addition, these data provide information regarding the duration of action of the corpus luteum, which is so important in properly preparing the endometrium for nesting of the fertilized egg. Concomitant estimation of the urinary levels of pregnanediol and studies of endometrium secured by biopsy at the onset of bleeding provide additional important information If the corpus luteum works at too low a level or for too short a time, the new orally active PROGESTOGENS (progestin-like compounds) permit satisfactory treatment.

Some twenty-five years ago there was interest in trying to determine the time of ovulation by electrical means This proved unsuccessful. Recently there has been a resurgence of interest in this field. Although progress is being made, the time has not yet arrived when woman can be fitted with a belt which has attached various electronic gadgets which will click like a Geiger counter, ring bells, or play music when she ovulates.

There has been growing concern about various

things that may be harmful to ovarian function. Physicians are becoming very conservative in the gynecological use of diagnostic roentgenograms, which necessarily entail exposure of the ovaries to the harmful roentgen rays. Some research studies, which employed different chemicals and drugs "tagged" with RADIOACTIVE ATOMS, have indicated that many of these are selectively absorbed by the follicular apparatus of the ovary and, perhaps by the egg. This may indicate the need for even broader studies of this character to indicate what chemicals and drugs when ingested may have damaging effects upon the germ plasm of the ovary.

Various tranquilizers have come into common use. Some of these have initiated lactation in non-pregnant women. Some animal experiments have indicated that some tranquilizers will prevent ovulation There is a possibility that their use by women may at times produce temporary ovarian sterility.

Studies many years ago indicated that the administration of estrogens in full substitutional dosages, from the end of one period until the time when the next period was due, would suppress ovulation Mass studies in Puerto Rico and in some sections of this country have indicated that similar use of several orally active progestogens would prevent ovulation and, therefore, would constitute an effec-

tive contraceptive regime. Therefore, women who are trying to get pregnant should avoid such treatment!

In general, the treatment of women who do not ovulate remains rather unsatisfactory. It would seem logical that these women would respond to treatment with various preparations of gonadotropins. The sequential and cyclic injection of gonadotropins from the serum of pregnant mares (EQUINE GONADOTROPIN) and of gonadotropin from human pregnancy urine (CHORIONIC GONADOTROPIN) occasionally induces ovulation. This form of treatment, however, seems to be much more effective when a woman is found all right by the various routine tests and even ovulates but cannot get pregnant. The mechanism of this action is not known but pregnancies have followed this kind of treatment. Perhaps this treatment contributes to a more normal development and preparation of the ovum, prior to its discharge.

There have been some reports that a single intravenous injection of a particular estrogen (PREMARIN) about the time of ovulation may induce ovulation or result in pregnancy of women who ovulate but who have difficulty getting pregnant. The physician may want to try this type of treatment. So far, howeve there has been no general confirmation of its benefi

Very recently small amounts of gonadotropi

prepared from human pituitary glands have been available for experimentation. Obviously, the source of supply of human gonadotropins is very limited. Very encouraging results are being reported in the induction of ovulation. This may herald a break-through in the treatment of failure to ovulate.

Much has been written about sterile women who have relatively large cystic ovaries, which have a very thickened CORTEX or covering This is not a very common condition. Good results have followed operations which involved removal by so-called WEDGE RESECTION of one-third to one-half of these ovaries. Of course, much useless surgery would result from the general employment of this routine in all women who do not ovulate. There are various tests which should be done before this surgery, in order to be reasonably sure that this type of ovaries is present One of these tests involves minor surgery through woman's vagina. A small incision is made in the upper back part of the vagina and a small lighted instrument, somewhat like a telescope and very much like a CYSTOSCOPE which doctors use to look up into the urinary bladder, is inserted into this vaginal opening. This instrument is called a CULDOSCOPE It permits an inspection of the ovaries If a sufficient view cannot be secured with this instrument, the vaginal incision can be lengthened (COLPOTOMY) and the ovaries can be brought down

into the vagina so that they can be more completely viewed. Sometimes these methods also give pertinent information about the condition of the tubes.

There is one other type of failure to ovulate for which recent knowledge has permitted effective medical treatment: this is the type which exists in the woman whose adrenal glands produce too much androgen and estrogen and too little HYDROCORTISONE. (Hydrocortisone is one of the very important adrenal hormones.) These women usually do not have periods. They usually have signs of VIRILIZATION, including excess body hair, acne, husky voices, CLITORIDAL ENLARGEMENT, etc. Their urine usually contains increased amounts of androgenic substances, i.e , of 17-KETOSTEROIDS. It has been found that the administration of CORTISONE, hydrocortisone, or the various derivatives thereof, would curtail the androgen production by suppressing the excessive adrenal stimulation by ACTH (the pituitary principle which stimulates the adrenals) if the condition were due to HYPERPLASIA of the adrenals. Continuation of this treatment results in cessation of the virilization, return of normal ovarian function, ovulation, and the possibility of pregnancy. As a result of these studies, there has been a tendency to expand this treatment to women who do not have virilization and elevated urinary 17-ketosteroids. The results have been generally negative. This type of empiric treatment is not recommended.

There has not been much progress made in the treatment of the male with low spermatozoal counts or with no spermatozoa. Some physicians are somewhat enthusiastic about the ability to increase low spermatozoal counts by giving the male, for three or four months, full substitutional dosages, or even greater ones, of androgen. The immediate effect of this is to reduce the spermatozoal count even more, and usually to zero. Occasionally, some months after treatment has been discontinued, a so-called REBOUND EFFECT occurs and the spermatozoal count is better. Most of the time there is no improvement or the spermatozoal count is worsened.

Sometimes males who appear unusually virile, are very muscular, have very large genitalia, and are very hirsute, are found to have quite low spermatozoal counts. Determination of the urinary 17-ketosteroids of some of these males may provide information that these are elevated: that is, these males are producing too much androgen. Treatment of these males with cortisone, hydrocortisone, or derivatives thereof, will be beneficial as in the case of virilized women with adrenal hyperplasia. Their spermatozoal count will improve.

There continues to be the belief that various SULFONAMIDES and possibly some antibiotics used in the treatment of URETHRITIS and PROSTATITIS of males may be very harmful to spermatozoa As a matter of fact, spermatozoa appear to be quite un-

affected by these infections, even when the seminal fluid is quite purulent and is even blood-tinged.

Artificial insemination employing seminal fluid of a donor, when husbands are hopelessly sterile and when wives are fertile, still continues to be a controversial procedure. Many physicians will carry out this procedure, when requested by the couple. The use of the term "AID" (artificial *insemination donor*) does not necessarily divest the procedure of the features which do not appeal to many physicians. The author has not yet resolved his ethical, religious, and moral objections to the procedure, whatever name is given it.

The consensus long has been that the spermatozoa carry the final determinant of the sex of the individual who will evolve from a fertilized egg. All eggs normally have an X-CHROMOSOME (genetic determinant). Spermatozoa normally have either an *X-chromosome or* a Y-CHROMOSOME. If the spermatozoon which fertilizes an ovum carries a Y-chromosome, then the fertilized egg has an X- and a Y-chromosome and will develop into a male, whereas *if the spermatozoon carries an X-chromosome*, then the fertilized egg will have 2 X-chromosomes and will develop into a female.

Recently it was reported in a medical journal (and subsequently given publicity in newspapers) that small-headed spermatozoa carried Y-chromosomes

and that large-headed spermatozoa carried X-chromosomes. This report, as yet, has not been confirmed. If it were true and if some ingenious person could devise a way of segregating these two types of spermatozoa and of assuring that only the desired one would fertilize an ovum, then a child of the desired sex could be ordered in advance. Such an incentive might make good propaganda for those who practice artificial insemination.

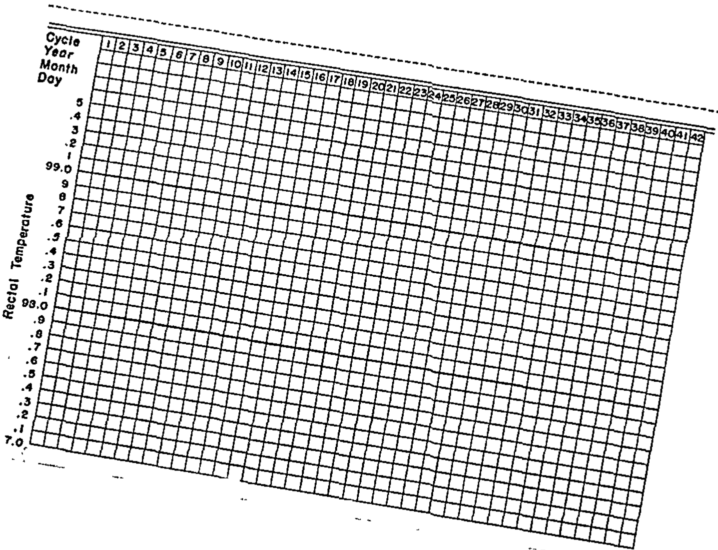
How to diagnose a baby's sex before its birth long has been the concern of granny tales and folk lore. Now it can be done by determining the CHROMATIN-PATTERN of cells which can be secured from the AMNIOTIC FLUID ("bag of waters"), if one were so bold as to pass a needle through a woman's lower abdomen and into her pregnant womb and suck out with a syringe some of this fluid and examine its cells under a microscope If the baby is a female, the cells will show a special mass of chromatin (genetic) material at the periphery of the nucleus of the cell i e., there is a CHROMATIN-POSITIVE status. If no such mass is present, the baby is a male, i.e., there is a CHROMATIN-NEGATIVE status. Obviously, this test is academically interesting but few women and few physicians would want to employ it in order to satisfy either's curiosity

Despite all the tests which the childless couple may have, there will be a small, but important, per-

centage of these couples in which the cause of the sterility is not established. These are the so-called "healthy childless couples." These couples bespeak a serious gap of our knowledge. Future studies may bring a clarification of the causes of sterility of these couples. The American Society for the Study of Sterility devoted a large segment of its 1960 Cincinnati meeting to a discussion of these "healthy childless couples."

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